Seroepidemiology of Human coronavirus OC43 and 229E in different age population

Abstract:
Purpose: 1.The aim of this study is to develop an indirect immuofluorescent assay tool for quantification of serum specific antibody to human respiratory coronovirus OC43 and 229E strains. 2. The second part of this project is to investigate the role of respiratory coronavirus in the pathogenesis of acute exacerbation of chronic obstructive pulmonary disease and congestive heart failure. We also investigate their roles in infantile acute brochiolitis.
Methods: We collect serum sample from patients admitted to the emergency department with non-infectious cause. We collected 300 serum samples from three age groups: elderly (age ≥ 65), young adult (age 16~45), and children (age ≤ 15). We cultured the OC43 and 229E strain coronavirus in human rhabdomyoma cell lines. Cytopahtic effects are hardly observed, but the existence of these two virses was confirmed by RT-PCR tests. We used serum sample as the primary antibody, and fluorescence-labeled goat anti-human IgG and IgM as the seconday antibody. In the second part of the syudy, we collected throat swab samples from ED patients with COPD or CHF that are aggravated recenty. We also collect the throat swab sample form patiens with COPD or CHF that do not have acute exacerbation in recent 1 month. In the pediatric population, we collect throat swab sample from young infants who presented to the ED with acute bronchiolitis. We perform RT-PCR with primers specifc for human coronavirus OC43 and 229E. We also use a multiplex RT-PCR microarray to detect co-infection of other common respiratory viruses.
Main results: Repaetd experiments fail to demonstrate specific immunofluorescnce for respiratory coronavirus OC43 or 229E, because the non-specific antibodies in human serum that binds the RD cells. By subtraction of background noise or pretreatment of serum with RD cell adsorption still fail to eliminate the non-specific bindings.2. About 13% of patients with acute exacerbation of CHF and 20% of acute exacerbation of COPD had coronavirus 229E infection, but none was detected in the stable CHF or COPD patients. About 7.7% infants who presented to the ED with acute bronchiolitis had 229E corona virus deteced. All of the positive samples were not found to have other respiratory virus co-infection on microarray tests.
Conclusion: Indiredt immunofluorescence assay is not suitable for quatification of human serum anti-229E or OC43 respiratory virus, if they are cultured in RD cell lines. Purification of virus antigenic proteins or production of these proteins by recombinant technology may overcome the non-specific binding problem, and should be used as a principal strategy to develop future ELISA kit. In the second part of the study, the coronavirus 229E has a pathogenic role in acute exacerbation of COPD and CHF; it may also cause acute bronchiolitis in infants.

Key words: human respiratory coronavirus OC43, human respiratory coronavirus 229E, congestive heart failure, chronic obstructive pulmonary disease, acute bronchiolitis