Editorial

Towards the prophylactic and therapeutic use of human neutralizing monoclonal antibodies for Middle East respiratory syndrome coronavirus (MERS-CoV)

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In 2012 September, Saudi Arabian businessman died from acute respiratory failure, which was caused by Middle East respiratory syndrome coronavirus (MERS-CoV) (1). The MERS-CoV is the first lineage C of the genus Betacoronavirus that is known to infect humans (2). As of December 2nd, 2014, a total of 927 cases of human MERS-CoV infection with 338 deaths have been reported by the World Health Organization (WHO) (3). Due to high fatality rate of 35% and clusters of human-to-human transmission, MERS-CoV is of global concern for a potential of pandemic. Contrary to spreading of human MERS-CoV infection worldwide, its specific treatment or vaccine is currently unavailable although interferon-α2b and ribavirin has been reported to improve outcome in MERS-CoV-infected rhesus macaques (4). Thus, agent development for MERS-CoV infection is an urgent issue for the world researcher.

Recently, Jiang et al. constructed two kinds of potent human neutralizing monoclonal antibodies derived from single-chain variable fragments of a nonimmune human antibody library and systematically investigated the effect of human neutralizing monoclonal antibodies on MERS-CoV in vitro (5). In the infection process of MERS-CoV, the receptor binding domain (RBD) of the viral envelope spike glycoprotein plays a significant role in the interaction with a cellular receptor like other coronaviruses, where dipeptidyl peptidase 4 (DPP4) was found to function as cellular receptor for MERS-CoV (11). As their expectation, two kinds of human monoclonal antibodies against RBD (MERS-4 and MERS-27) showed potent neutralizing activities against pseudotyped and live MERS-CoV infection with 50% inhibitory concentration of nanomolar scale, where the activity of MERS-4 is stronger than that of MERS-27. In addition, biochemical analysis revealed that the entry of MERS-CoV is inhibited by blocking the interaction between RBD and cellular receptor DPP4 through MERS-4 and MERS-27. It is worth noting that the synergistic effect to pseudotyped MERS-CoV was also confirmed when MERS-4 was used with the combination of MERS-27. This phenomenon...
was accounted for the different epitope recognized by two antibodies. These strong and broad ranged inhibitory activities of combined two antibodies could make it possible to be applied to mutant MERS-CoV, where mutations often occur during viral infection and transmission.

Assuming the increasing number of virus careers and following deaths by MERS-CoV day by day, this study demonstrates the potential to open the door for their prophylactic and therapeutic use in MERS-CoV infection.

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**References**


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