

抗病毒藥物及疫苗發展最新進展

Update for the antiviral treatment and vaccine development

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As coronavirus disease 2019 (COVID-19) becomes a pandemic outbreak globally, the disease course and spectrum have been characterized. Initially, COVID-19 is recognized as a febrile viral respiratory disease, and different organ involvements are reported later. Based on the current understanding for pathophysiology of COVID-19, the disease course may be divided into the following stages. The initial stage is defined by viral inoculum and establishment of infection in early infection phase. In this stage, upper airway symptoms with or without fever last at least for one week. Most people's conditions improve in the following weeks. The second stage develops if pulmonary invasion become prominent. Correspondingly, dyspnea and decreased oxygen saturation develop since the second week after infections. Most of them are indicated for hospitalization with oxygen supplement through different methods. Some may recover from COVID-19 in the second stage, while others subsequently experience acute respiratory distress syndrome (ARDS) and cytokine releasing syndrome (CRS), and eventually die of COVID-19.

Management of Covid-19 is guided by the severity. The therapeutics against SARS-CoV-2 are categorized as antiviral therapy and immune-based therapy. Generally, early administration of antiviral therapy may be beneficial for patients with COVID-19, while the role of immune-based therapy is important in ARDS and CRS. Till now, remdesivir, the RNA polymerase inhibitor, is the first and only antiviral agent approved by the U.S. Food and Drug Administration for use in adult and pediatric patients 12 years of age and older for the treatment of COVID-19 requiring hospitalization. Based on the results of clinical trials, the beneficial effect of remdesivir on time to recovery is most pronounced in hospitalized patients with COVID-19 requiring supplemental oxygen without the need for a high-flow device, noninvasive ventilation, invasive mechanical ventilation, or ECMO. The recommended treatment duration is 5 days and may be extended to up to 10 days if no substantial clinical improvement is seen at Day 5. Other investigational antiviral agents evaluated in clinical trials will be also discussed in this section.

As for preventive strategy, development of effective vaccines against SARS-CoV-2 will play a key role in preventing morbidity and mortality from COVID-19 and subsequently terminating the current pandemic. To date, 47 candidate COVID-19 vaccines are in clinical development, including 10 of them entering phase 3 trials. Vaccine platforms used for SARS-CoV-2 vaccine development consist of virus, viral-vector, protein-based, and nucleic acid vaccines. The platforms for inactivated or live-virus vaccines are well-established approaches, while platforms for vectored vaccines and recombinant protein vaccines have recently resulted in licensed vaccines for other viral diseases. Of note, platforms for RNA and DNA vaccines have yet been approved for any vaccines. The principles and challenges of different vaccine platforms will be summarized, as well as the assessment of the clinical efficacy of vaccines against SARS-CoV-2.