

# **Immunology of COVID-19: Current state of basic science and clinical practice**

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On the basis of recently published literatures about vaccine development against coronavirus disease 2019 (COVID-19), we are bringing together critical information from news, short communication, reviews and original articles and highlighting the prompt, direct responses of the international vaccine companies and Taiwanese government in establishing vaccine strategies. As the biological and pathogenic feature of SARS-CoV-2 is new to humankind and the protective immune responses against this virus is poorly understood, it is unclear which vaccine strategies will be most effective and successful. Therefore, it is urgent and compulsory to develop various vaccine platforms and strategies in parallel. Basically, there are six major types of candidate vaccines for COVID-19, including live attenuated virus, recombinant viral vectored, inactivated virus, protein subunit, virus-like particles and nucleic acid based vaccine. In this presentation, we discuss the immunological characteristics and principles that need to be considered in the development of vaccines against COVID-19. On the basis of these principles, we examine the current COVID-19 vaccine candidates, their strengths and potential shortfalls, and make inferences about their chances of success. We also illustrate some scientific and practical challenges that will be faced in the process of developing a successful vaccine and the ways in which COVID-19 vaccine strategies may evolve over the next few years.