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Different Possibilities Associated with Vaccination Strategies of COVID – 19

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ABSTRACT: The origin of COVID-19 outbreak at the beginning of year 2020, caused by a novel coronavirus, Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), created an enormous need to gain insights into this new virus and to develop ways to control its spread. The development of a vaccine to prevent coronavirus disease 19 (COVID–19) became a global requisite, and defining the global challenges and potential hurdles became critical since regulatory and medical decisions are based on the risk-benefit calculations. If approximately 60 – 70% of people develop immunity against the pathogen the pandemic spread is restricted. Since the SARS–CoV–2 is new to human population, the consequences of repeated epidemics will be unacceptably high mortality, severe economic disruptions, and major adjustments to our daily lifestyle. Therefore, the benefit of developing a vaccine is enhanced as it was deployed in an unprecedented time to prevent the repeated or continuous epidemics. However, the target of most of the SARS-CoV-2 vaccine development globally is its receptor binding domain and according to the world health organization most of them are being delivered by intramuscular injections to achieve broadly neutralizing immunoglobulin G antibodies, yet a key question is can it provide a durable immunity as it is a rapidly evolving virus and furthermore the respiratory vaccines, in general, provide limited protection against viral replication and exfoliation within the airway, as this requires a local mucosal secretory IgA response, also at which extent it contributes to the antibody dependent enhancement.

KEYWORDS: Vaccination strategies for COVID-19, Antibodies and COVID-19 vaccine, ADE

I. REVIEW

Novel coronavirus pneumonia emerged in Wuhan city, China In December 2019. It was initially linked to animal-tohuman transmission but, eventually, human-to-human transmission of the virus emerged, giving rise to a widespread respiratory illness in Wuhan and other urban areas of Hubei Province, China, Afterwards the virus then spread across China and all around the planet. On 11 February 2020, World Health Organization named the syndrome COVID-19 or coronavirus disease 2019, and the virus was named SARS-CoV-2. COVID-19 is marked by severe respiratory illness and remarkable mortality. Moreover, SARS-CoV-2 is highly transmissible and it has achieved a worldwide spread, and on March 11, WHO has characterized it as a pandemic. As COVID-19 is new to humankind it is essential to develop effective and safe vaccine strategies to control the pandemic, but most of the vaccines present against COVID-19 are strategized to target the receptor binding domain or the spike protein of the virus to achieve IgG antibody production against systemic viremia and aid to the mucosal immunity. The status of current COVID - 19 Vaccine within WHO prequalification and emergency use listing can be tracked with the help of link provided below as the landscape is updated twice a week. https://www.who.int/publications/m/item/draft-landscape-of-covid-19-candidatevaccines However, the protection against the virus may not last long due to the rapid changes in the viral genome and its inability to generate mucosal IgA antibodies in the lungs consequently asymptomatic nasal viral shedding from vaccinated individuals, as a result, the protection against the virus becomes limited, also, there is a chance of induction of ADE (Antibody-dependent enhancement) because of which mankind can face a self borne adversity as SARS-CoV-2 has some degree of similarity from SARS-CoV and MERS which were observed to induce ADE, this creates an enormous need for some new vaccine strategies. To prevent viral replication credibly inside the mucosal primary target cells appropriate production of secretory IgA is required and this can be induced by mucosal route of vaccination, as the immune system of mucosal surfaces is mainly composed of MALT and contributes about 80% of immunocytes in the human body. Since SARS-CoV-2 is a respiratory disease the respiratory mucosal vaccination would be effective at

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inducing mucosal antibodies, T_{RM} cells and macrophage mediated innate immunity. Besides some challenges with mucosal vaccination there is also requirement for safe and effective mucosal adjuvant and its delivery method.

II. CONCLUSION

The need for a vaccine against the SARS-CoV-2 has been accomplished but we should find some more effective ways to better immune the naïve human population against this rapidly evolving virus and we should also consider some possible threats associated with the vaccines such as ADE, while the long term effects of them are still not known.

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