International Journal of Pharmacy
Journal Homepage: http://www.pharmascholars.com

Editorial **CODEN: IJPNL6**

A Brief Note on Timelines of COVID-19 Vaccines

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Received: 07-Feb-2022, Manuscript No. IJP-22-60689; **Editor assigned:** 11-Feb-2022, PreQC No. IJP-22-60689(PQ); **Reviewed:** 21-Feb-2022, QC No. IJP-22-60689; **Revised:** 28-Feb-2022, Manuscript No. IJP-22-60689(R); **Published:** 07-Mar-2022, DOI:10.37532/2249-1848-22.12.10.

DESCRIPTION

The Health Organisation discussed the "Top Threats to Human Health in 2019" and developed a plan to deal with the issues. It was one of the contagious diseases. The importance of emerging and reemerging viral viruses that can cause global pandemics with devastating consequences was emphasised. A kind of acute respiratory disease known as SARS (Severe Acute Respiratory Syndrome). Coronavirus-2 (SARS-Cov-2) has resulted in a pandemic of Coronavirus disease-19 (COVID-19), resulting in global public health and economic crises [1]. Diagnostic and therapeutic countermeasures, and the rapid development of a vaccine, are all desperately required for the prevention and control of this terrible illness. Since the WHO reported the first instance of this disease on December 31, 2019 and the virus's entire genome sequence on January 5, 2020, scores of laboratories around the world has been working on a vaccination.

The number of human coroviruses, including COVID-19, are derived from bats, and they have different levels of similarity. COVID-19's whole genome sequence is about 50% similar to MERS-CoV's. Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS) are caused by a unique virus that is a single-strand RNA that attaches to human cells *via* Angiotensin Converting Enzyme 11 (ACE-2) receptors (SARS). This virus, including the ones seen in Eastern India, is still developing globally. The geographic distribution, severity, and danger of subsequent waves of disease caused by these genomic variants are unknown at this time.

Vaccine development phases

Vaccine development is divided into several stages: Challenge studies have been used to execute preclinical trials in suitable animals to ensure safety and efficacy. Clinical studies are done in four phases:

Phase I: Vaccines are administered to a small group of human volunteers with the goal of ensuring their safety while also monitoring their immune response [2,3].

Phase II: A few hundred volunteers of various ages are vaccinated to further examine the vaccine's safety and efficacy.

Phase III: Thousands of volunteers are immunized in order to monitor protection and safety. Finally, the data is analysed and evaluated before being presented for approval to regulatory authorities.

Phase IV: Post-marketing surveillance for protection and any adverse occurrences is phase IV. The overall process could take several years. However, in an emergency case like this, it can be sped it up by conducting phase 1 to 3 trials at the same time and cooperating with scientists from various institutions. There are over 200 vaccine candidates in active development, with 15 of them undergoing human clinical trials.

Candidate virus vaccine

- **Virus Vaccines with Inactivated Surface Proteins:** Virus could be inactivated with heat or a chemical, but their surface proteins stay intact. However, it is possible that it will not be immunogenic and that further doses may be required. Take the Salk vaccine.
- A live attenuated vaccination is one in that the virus has been modified to be immunogenic but non-virulent.
- Non-replicating Viral Vector Vaccines: genes for viral proteins are found and placed in a harmless carrier virus, which is then delivered into the host cell, which produces the viral protein and stimulates the host's immune system. This method is used by the University of Oxford and AstraZeneca.
- **Vaccines by Replicating Viral Vectors:** the virus can proliferate in the host, producing copies of vaccine proteins and protective antibodies. Vaccine against Ebola.
- **RNA Vaccine:** RNA codes for the spike protein on COVID-19's surface. The immune system is stimulated by the RNA vaccine to develop protective antibodies against the viral S protein.

DNA vaccines: Vaccines carry genetic instructions to host cells, causing them to create RNA, which stimulates the immune system to produce antibodies.

Protein subunit vaccine: The disease's actual protein is injected, and the immune system produces protective antibodies in response. Novavax is using this approach.

Vaccine that has been repurposed: The Bacillus Calmette-Guerin (BCG) vaccine is a live attenuated tuberculosis vaccine. It is the most widely used vaccination in the world, with an 85 percent success rate. In India, children are vaccinated from the time they are born. Several epidemiological studies have shown that it lowers disseminated TB and neonatal mortality. Because BCG protects against unrelated respiratory infections and newborn sepsis, this is the case. Innate cells are activated by BCG and engulf and destroy virus. (Immunity that has been cultivated) When used for immunotherapy, another related bacteria, Mycobacterium vaccae, also protects mice and people against tuberculosis.

BCG enhances innate immunity and may reduce COVID-19 viral load as well as cytokine storm. BCG has a boosting effect in general. Some ecological studies have found a "link between prior BCG vaccination and COVID-19 cases." However, more research is needed. Professor David Levine of the University of California, Berkeley, claims that research in Spain and Italy provide "shreds of evidence" that BCG may protect against COVID-19 [4-7].

Vaccines timeline: Around 200 vaccines are currently being developed. Only 11 are in Phase I, 8 are in Phase II, and three are in Phase II/III. Others are still in the early stages of development. The Indian Council of Medical Research (ICMR) has teamed up with Bharat Biotech International Limited to develop an indigenous Covid-19 vaccine, while the Serum Institute of India has joined forces with AstraZeneca and Oxford University to provide AZD 1222 vaccine to India. Substantial attempts are being undertaken to get the vaccines as quickly as possible. We hope to have these in place by the beginning of next year. However, there are a number of logistical and policy factors to be considered, such affordability, equitable distribution across countries, professional priority, dosage, vaccine reluctance, repeat doses, and prohibitive costs [8-10].

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