LETTER TO THE DIRECTOR 🔓

Race against time: vaccine development for COVID-19

Carrera contra el tiempo: creación de una vacuna contra la COVID-19

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Mr. director:

For several months now, the global dynamics have changed due to a new disease, causing a severe acute respiratory syndrome by the coronavirus-2 (SARS CoV-2). COVID-19 pandemic has caused a global shock, inducing changes not only in the health field, but also in the social and political arena. It is crucial to develop safe and effective vaccines to control this disease, eliminate its spread and prevent future recurrence.

Ever since SARS CoV-2 shares significant sequence homology with two other coronaviruses (SARS-CoV and MERS-CoV) the vaccines identified in these patents related to those viruses could facilitate the design of vaccines against the virus causing COVID-19. There are 363 patents in the American Chemical Society (CAS) content collection related to the development of vaccines to prevent viral diseases, including SARS and MERS. Of these, 188 patents are directly associated with anti-SARS and anti-MERS vaccines with a demonstrated immune response[1].

Viral S-protein subunit vaccines were reported to produce higher neutralizing antibody titers and more complete protection than the attenuated in vivo SARS-CoV, full-length S-protein and DNA-based S-protein vaccines. Collectively, the S protein is the preferred target site in SARS/MERS vaccine development, and the same strategy may potentially be useful in the development of SARS-CoV-2 vaccines[1].
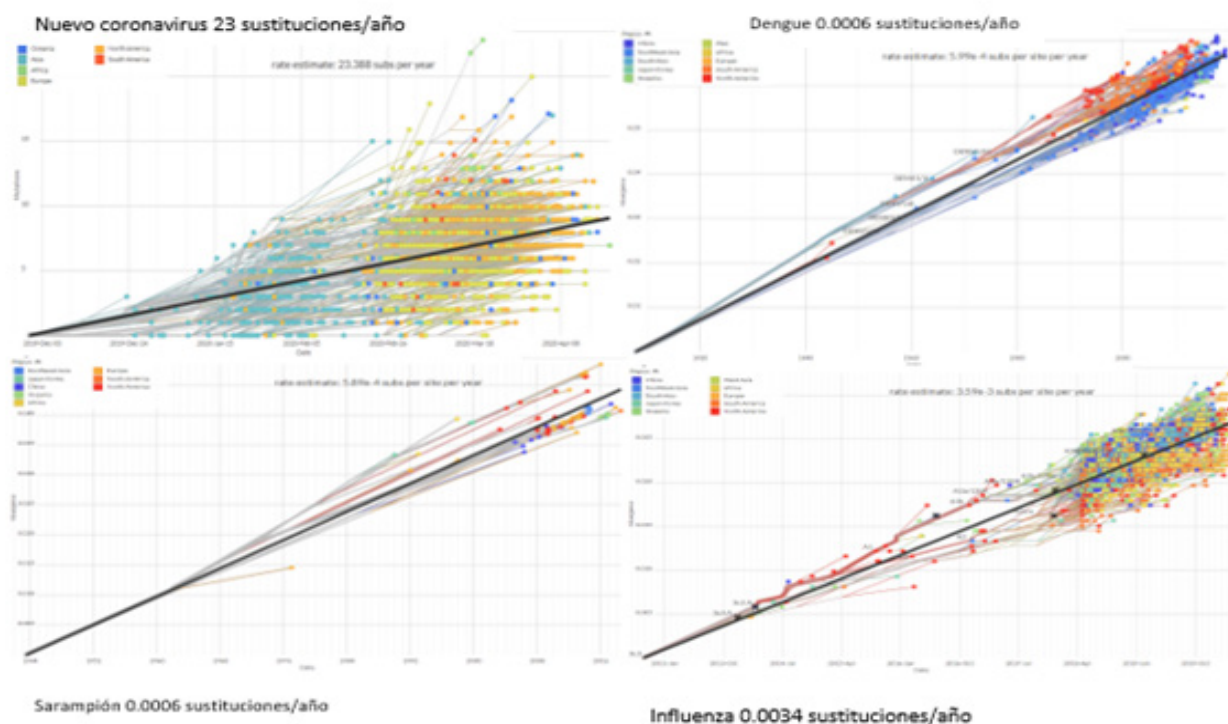
One of the advantages of recombinant protein vaccines is that it is not necessary to handle infectious viruses as adjuvants can be used to increase immunogenicity; however, the disadvantages lie in the overall production capacity, which can be limited and antigen integrity needs to be confirmed, and yields must be sufficiently high[2]. Suitable animal models to evaluate vaccines for SARS and MERS-CoV are scarce or very limited; this makes the process of vaccine development a great challenge[3].

With the emerging of SARS-CoV-2, there are about 15 potential vaccine candidates worldwide, in which a wide range of technology was applied. It is likely that most candidates will take approximately one year to begin phase-1 of clinical trials. However, the kit developed by the Beijing Genomics Institute (BGI) has passed the emergency approval procedure of the National Medical Products Administration, and is currently used in clinical and surveillance centers in China[4]. This is why the development of the SARS-CoV-2 vaccine remains a major challenge for medical personnel; where a rapid and valid solution is needed.

The mutation rate of the novel coronavirus is very high, so it is difficult to find common antigens that produce memory. Mutation rates have decreased over time, often resulting in sequencing of the virus

genome. This is why it initially had 30 replacements per year and now has 23 replacements per year. It is expected to reach its mid-point in terms of mutations in the following months.

Figure 1 shows different Phylogenetic trees of material that has been sequenced, it shows with a point the genome of each microorganism and in each image complete the level of dispersion of these same genomes, the greater dispersion between points greater differences between them (mutations) (figure 1).

http://nextstrain.com

Figure 1. Phylogenetic trees of pathogens in comparison by their replacement rates per year, the trees are colored by regions.

It is a great challenge to find a vaccine that creates immunity in such a short time, especially because of the above mentioned features and because of the procedures that have to be followed in the research and implementation phases. The scientific community continues in its mission to find efficient answers to stop this race against time: a treatment against COVID-19.

CONFLICT OF INTERESTS

The autors declare that does not exist an interest conflicts

AUTHORSHIP CONTRIBUTION

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