

A Current Glance Regarding the Experience of Cuban Vaccination Advance Against COVID-19

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ABSTRACT

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Introduction

When COVID-19 arrived in Cuba, the government immediately mobilized its public health system and biotech industry. By 2020 in this country, the total number of infected cases and deaths corresponded to one of the lowest rates in the Western Hemisphere; however, the reopening of airports in November of that year caused a new increase. Despite this, the case fatality rate among infected people in mid-March 2021 was only 0.59% compared to a global average of 2.2% [1]. Cuba's biotechnology industry seeks to meet the needs of the public health sector. Dozens of academic, research and development institutions collaborate extensively and continuously on it, sharing their resources and knowledge, all of which have been essential in the development of vaccines against COVID-19.

The Cuban vaccines Abdala, Soberana 02 and Soberana Plus against COVID-19 are self-produced and it is planned to supply them at a reduced cost to other countries [2]. They are protein subunit vaccines; this means that they are composed of a synthetic

fraction of the S protein of SARS-CoV-2 (called RBD, receptor binding domain) that binds to human cells, which generates neutralizing antibodies that block the bonding process [3]. This design was chosen precisely because of the experience accumulated in Cuba with subunit vaccine production platforms [3]. The first works date back to August 1st, 2020. An efficacy of more than 90% of these vaccines against COVID-19 is recognized nowadays.

Although Cuban vaccines are not the only ones that use this strategy, Soberana 02 is unique because it combines the antigen receptor-binding domain with an inactivated form of tetanus to enhance the immune response (conjugate vaccine). The Soberana 02 and Soberana Plus vaccines are produced by the Finlay Institute in partnership with the Center of Molecular Immunology and the National Center for Biopreparations. The mechanism of action of these consists of inserting genetic information into cells of higher mammals. Soberana Plus has been intended for convalescent patients initially. Abdala is based on the insertion of viral genetic

information in the *Pichia pastoris* yeast and is produced at the Center of Genetic Engineering and Biotechnology [1].

Since the vaccines are stable at temperatures of 2 to 8°C, there is no need of an additional investment in specialized refrigeration equipment. In addition, several countries expressed interest in participating in clinical trials of these vaccines during 2021, including: Iran, Venezuela, Mexico, Jamaica, Vietnam, Pakistan, India and the African Union (on behalf of the 55 nations) [1]. It was specifically in May 2021, that it was decided to start mass vaccination in Cuba [3]. The data obtained to date regarding the duration of the immune response with Cuban vaccines show antibody titers up to eight months. Currently, with more than 95% of its population fully vaccinated against COVID-19 and with the number of daily infections and deaths from the virus in drastic decline, Cuba is making progress in controlling the epidemic after months of confinement. The effort seems to be paying off, because the health authorities reported in November 2021 a recovery rate of 99.1% of those who have become ill [4]. According to what was reported in Our World in Data [5], 34 million doses had been administered on January 26th, 2022. This same source offers evidence of the vertiginous increase in the percentage of the population completely immunized in May, August and December 2021, with numbers of 0.6%, 42.0% and 90.2% respectively.

The vaccination of the child population between 2 and 18 years old is also progressing at a good pace. It was on March 1st, 2020 that the first pediatric patient was diagnosed in the country. In September of that year, Cuba began the first National Children's Campaign against COVID-19 worldwide, which made it possible to achieve high vaccination coverage and a significant impact in reducing the transmission of SARS-CoV-2 based on Soberana 02 [6]. The main reasons that led to vaccination in this age range were:

1. The increase in the number of infections in these groups due to the appearance of more contagious variants of the virus and its greater displacement from the already vaccinated adult population to infants and
2. Despite the fact that the asymptomatic form is the most common in these cases, it has been proven that diverse sequels persist even after mild and moderate forms.

In parallel, the vaccination campaign on the island is already in the stage of applying booster doses, to face the threat posed by the new Ómicron variant. By December 2021 in Cuba, the detection of six people infected with Ómicron had been reported, four of them Cubans and two tourists from South Africa, Kenya and Mozambique. Those over 18 years old will receive a booster dose with Abdala or Soberana Plus six months after completion of the primary vaccination schedule. This vaccination campaign began in November 2021 and should end in the first half of 2022 [7]. Stratification will be made by risk groups: priority

1. Researchers and health workers, tourism personnel, customs, carriers, teachers and military personnel; priority
2. Population over sixty years of age, pregnant women and patients with comorbidities; priority
3. Rest of the adult population. The data shows the favorable evolution of the process during December 20th and 31st in 2021, with values of 7.9% and 14.4%. A significant increase in the population vaccinated with the booster dose was evidenced until January 26th, 2022, with 44.6% of Cubans with this dose [5].

Final Considerations

In general, the Cuban population shows a high level of acceptance of the applied COVID-19 vaccines, which constitutes a threshold element in the achievement of increasingly encouraging results. Regarding the new Ómicron strain, it is considered that although the Cuban territory has a significant degree of immunity, the health alert must be maintained and surveillance measures must be reinforced, especially at the borders. A call is made to the world population about not to trust and the need to learn how to live with the disease in a responsible way.

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Competing Interests

The authors do not declare competing interest.

Author's Contribution

All authors have actively participated in the writing and critical review of the final version of the scientific text that supports the present research.

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