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Vaccination against COVID 19: One world, one health

Vacunación contra la COVID-19: Un mundo, una salud

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The emergence of a new infectious disease inevitably gives rise to highly complex situations, particularly when it takes the form of a worldwide pandemic of the sheer severity of COVID-19. After the identification of the first few cases in China at the end of 2019, on 30 January 2020 the WHO stated that the COVID-19 epidemic met the criteria to be confirmed as a public health emergency of international concern and on 11 March 2020 it declared the outbreak a pandemic[1,2]. On 7 January 2020, the causative agent was isolated, a new coronavirus that was given the name SARS-CoV-2. On 12 January 2020, Chinese scientists posted the novel coronavirus RNA sequence on a preprint server.

Soon afterwards, scientists from all over the world started targeting their efforts towards developing a vaccine against SARS-CoV-2. Many believed that working as part of a biotechnological platform could help save a very highly valuable months in the development of new vaccines[3-5]. Fortunately, time proved them right. The first clinical trial of a vaccine against SARS-CoV-2 started only 66 days later: a group of volunteers received an experimental messenger RNA (mRNA) vaccine called RNAm-1273, developed by biotechnological company Moderna and the National Institute of Allergy and Infectious Diseases (NIAID) of the United States of America. On the 27 July, following on the first encouraging results obtained, phase 3 clinical trials started for both RNAm-1273 and another vaccine named BNT162b2, developed jointly by BioNTech, a German biotechnological company, and US pharmaceutical company Pfizer with a total of over 60,000 volunteers from different countries. The phase 3 trials demonstrated the efficacy and safety of both vaccines[6,7]. The results of two DNA-based vaccines, vectored by adenovirus and developed by AstraZeneca in collaboration with Oxford University and by Johnson & Johnson's European subsidiary Janssen, were published at the same time as those of the mRNA vaccines. According to GAVI, the Vaccine Alliance, in December 2021 there are 194 vaccine candidates against COVID-19 at preclinical stages and 124 at clinical experimentation phases, together with the 23 vaccines already in use in different countries in the world. In the European Union, four vaccines have so far been approved by the European Medicines Agency, namely those produced by Pfizer-BioNTech, Moderna, AstraZeneca-Oxford and Janssen. All of them showed very good results at their original clinical trials (efficacy levels above 70%)[6-8] and have been shown to offer robust protection against the most severe forms of COVID-19, including all the variants of concern (VOCs) identified so far, particularly delta and recently omicron.

The availability of approved vaccines is unfortunately not sufficient to control the COVID-19 pandemic on a global scale. This goal can only be achieved if such vaccines are produced at mass scale and at an affordable price, if they are equitably and reasonably distributed across the world, and if each country administers and manages them quickly and efficiently. The four dimensions of vaccination: development and production, accessibility, availability, and distribution are crucial and closely connected to one another[9]. In the case of the vaccines against COVID-19, a handful of manufacturers managed to develop and produce successful products within 12 months, a most extraordinary achievement taking into consideration that it usually takes from 8 to 10 years to develop a new vaccine[10].

Given the urgency to vaccinate thousands of millions of people to achieve functional control of the pandemic, the world now needs more doses of vaccines against COVID-19 than have ever been produced of any other vaccine. Reaching herd immunity seems less and less likely taking into consideration the high transmissibility of the new variants of coronavirus; the absence of a genuinely protective effect against infection; the phenomenon of waning immunity against infection, which makes it necessary to administer booster shots to a significant part of the general population; and the ever-present risk that some VOC, like omicron, are associated with enough immune evasion to require a change in the type of vaccines being administered. All of these challenges have resulted in new ways of investigating and scaling up the production of vaccines, academic institutions having worked hand in hand with small biotechnological companies and large pharmaceutical multinationals. Governments and non-profit-making organizations the world over have sponsored clinical trials, invested in production infrastructures and concluded contracts for the manufacturing and distribution of vaccines against COVID-19 in order to accelerate the vacci-

nation process and make it as massive as possible.[11] However, hundreds or thousands of millions of people have not had access to vaccination against COVID-19 in 2021 and are unlikely to have it in 2022, which could prolong the duration of the pandemic and increase the risk that new variants of coronavirus against which vaccines could be less effective may develop and spread. In 2018, 74 of the 194 WHO member countries did not have one single adult vaccination program in place for any type of vaccine. They had no vaccination records, or the storage, distribution and waste disposal systems required to administer vaccines on a large scale. The experience gained during the 2013-2014 Ebola crisis in Western Africa showed that it is possible, albeit at a small scale, to administer a vaccine that requires special transport conditions, similar to those needed by some of the vaccines against COVID-19. Should new vaccines be developed in the future that can be stored in a normal refrigerator or even at room temperature, or that can be administered in one single dose, all logistic complications would be drastically reduced.

It is not only necessary for vaccines to be available. They must also be adopted and used by the population. Acceptance of vaccines may be affected by negationist attitudes and by a skepticism about vaccination. These situations are common both in low-income and in high-income countries, where many citizens belonging to different socioeconomic, religious, ethnic or political groups are reluctant or even downright opposed to vaccination[12,13]. In the specific case of vaccines against COVID-19, according to surveys carried out in Spain, reluctance was as high as 40% in certain regions of the country at the beginning (before the first doses became available), with people stating that they had rather wait before taking the jab. This initial reluctance melted away (with increases in acceptance rates of nearly 20 points) when the first effectiveness data of the approved vaccines came to light. As it happens, Spain is today one of the countries with the highest percentage of its population vaccinated against COVID-19, which is a result – among other factors – of the high level of trust of the population in the public health system and of an effective vaccination campaign that has always strived to place the citizen at the center.

Another very important aspect is the population's perception of the safety of vaccines once they start being used on a massive scale. In Spain, for example, a few thrombotic events were reported following administration of the AstraZeneca and Janssen vaccines. The existence of robust and powerful pharmacovigilance systems that allow detection of potential increases in the incidence of adverse events in connection with a given vaccine and a quick and rigorous evaluation of potential cause-effect relationships are fundamental aspects, which should be combined with a comprehensive decision-making process by the relevant healthcare authorities. These authorities, including the European Medicines Authority (EMA) and the Spanish Medicines Authority (AEMPS) should work with diligence, use the best evidence available and clearly and transparently disclose the reasons behind their decisions.

A cooperative effort is required to distribute and use vaccines against COVID-19 in a fair, equitable and caring manner. Only then will it be possible to reduce mortality and the incidence of the most severe manifestations of this disease, which should bring us closer to achieving functional control of the pandemic, economic recovery, and a return to the so much longed for social "normalcy," be it the one of old or an entirely new one. Although the social value of vaccines against COVID-19 is enormous, if people cannot get vaccinated when they should, their value disappears. Achieving this goal requires vaccines to be accessible and available to every country in the world. It also requires governments to be in possession of the administrative and political ability to implement the necessary vaccination campaigns. Finally, it requires all of us to be capable of going the extra mile every day.[14,15] Nearly two years into the pandemic, science and biomedical research have brought us closer to answering the question that everybody is asking these days: "When will all of this be over?" We do not have an answer, but we can be confident that if we manage to vaccinate 70% of the world's population we shall be closer to the end of this nightmare.

Conflict of interest

Antoni Trilla and Anna Vilella are currently participating as collaborator investigators in publicly (ISCIII) and privately (Janssen, Hipra)-funded clinical trials of vaccines or vaccine candidates against COVID-19. AT provides regular training and consultancy services to several pharmaceutical companies involved in the manufacturing of vaccines or treatments against COVID-19 (Bayer, GSK, MSD, Roche, Sanofi-Pasteur, Pfizer).

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