Letter to the editor

The role of basic research against COVID-19

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El papel de la investigación básica frente a la COVID-19

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Basic research is questioned for the contributions it generates because many times there are no obvious results that can be applied for the benefit of society in the short term. However, it is a controversy that it is now inadmissible to conceive of a society without science.

The experience of the SARSCoV-2 pandemic has recalled the essential role that new knowledge has in making decisions assertively, either in individual daily lives or the focus of decision makers. Now more than ever, knowledge is invaluable in society.

The response generated towards the COVID-19 pandemic arises from the scientific contribution enriched from centuries ago, from different fields of basic research. For example, it was discovered that viruses are the cause of many diseases in the area of virology in 1892. Thus, the first coronavirus was described in 1965. Also, thanks to basic research, in 1978, it became known that protein S is required to cause infection and it is the target of many vaccines nowadays.

In the field of Immunology, it was discovered that vaccines protect against diseases in 1798, but it was not until 1890 that it was discovered that antibodies protect against infection. Research in such fundamental sciences as Cell Biology allowed that in 1899 it was discovered that cell membranes are made up of lipids and form a barrier of molecules on the outside of the cell. This led to the discovery in 1972 that lipid droplets can be used to transport material within the cell; this knowledge has been relevant to the transport of messenger RNA in COVID-19 vaccines.

There have been many contributions of Molecular Biology for the current fight against the pandemic. Since mRNA was discovered in 1961, scientists from 1966 onwards can read the mRNA model for protein production[1], which is the basis for biological production.

Thus, also, thanks to the theory of germs born from basic research of many scientists, aseptic and antiseptic techniques were imposed, which have been one of the most effective and inexpensive public health interventions such as the discovery of the benefit of hand washing to prevent diseases in the nineteenth century[2].

Basic research has been answering different questions: what, how, why, to various mechanisms of life. Due to its purpose of analyzing how processes or concepts work, it has been providing input on the causality of diseases.

What seems to be a simple product that is actually a knowledge obtained not in a linear way, where different areas have had to be related. As new knowledge emerges, it is taken up again to improve approaches and proposals on innovative possibilities that complement concepts and develop knowledge of both translational and clinical research. The first one is responsible for collecting and applying the data and information obtained from basic research to per-

form a "translation" for the search for potential therapies; the second one collects the achievements of translational research and tests whether they are safe and effective in the treatment of diseases in human clinical trials. This steady stream of new discoveries is synergistic in driving innovative research.

COVID-19 has appeared at a time when the scientific system is more sophisticated and has faster global responses than in the past. The Internet, the growing culture of open science, the convergence of digital technologies and biotechnology have transformed this research overview.

Facing a health crisis of the dimension of the COVID-19 pandemic has required having scientific systems capable of developing rapid and effective detection tests (both in sensitivity and specificity), seeking effective therapies, developing vaccines and perfecting predictive algorithms of the evolution of the pandemic. This is not possible without knowledge of the biological mechanisms of similar viruses, which requires several years of basic research; also, it is necessary to have the qualifying conditions for research, such as access to reagents, equipment and specialized personnel, laboratories with adequate biosecurity levels and large databases on mobility patterns and characteristics of the population[3].Understanding how this disease works is essential to be able to find a way to fight it.

COVID-19 mRNA vaccines (such as those manufactured by Moderna and Pfizer- BioNTech) are good examples of how basic research lays the groundwork for innovative technologies to improve human health. These vaccines are lipid droplets that deliver a set of instructions (the mRNA) to cells to train the body to fight coronavirus infection and, in human trials, they have been shown to be highly protective against severe COVID-19. The ingredients of these vaccines are quite simple, but they could never have been manufactured without the fundamental knowledge of molecular biology, virology, immunology, and cell biology that scientists have accumulated over centuries of basic scientific research[1].

Given the experience we are acquiring from the COVID-19 pandemic, as a country and within the Latin American region, it should work to recognize the lessons given, including the importance of investing in the generation of greater scientific abilities, as well as the intensity and form that this effort should take.

Long-term funding for strengthening scientific competencies, conditions for regional collaborative partnerships, fostering proactive science and technology should be redefined; at the same time the availability and access to data for the development of technological solutions is improved and that contributes to a decision making based on an objective support with a scientific basis.

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