Editorial

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ABOUT THE "MISSION OF SCHOLARS": SOME THOUGHTS REGARDING INVESTMENT IN SCIENCE AND TECHNOLOGY IN THE COLOMBIAN HEALTH SECTOR

In February of this year, Colciencias, in representation of the Colombian government and under the oversight of the Vice-President's office, convened the "Mission of Scholars" (1). The Mission revolves around eight themes in different areas of knowledge or economic sectors. One of the themes is Health and Life Sciences. Cutting across all the theme areas is the task of making recommendations on how to improve education as the first step towards closing the gaps in science and technology in the country. The starting point is the assumption that scientific and technological development must focus on finding solutions to problems of everyday life, lead to sustainable development, further economic growth and, therefore, serve as a means to improve the living conditions of human beings.

I wish to put expound on a few thoughts regarding some possible options which could lead to the development, over the next years, of research, innovation and technology in the health sector and in life sciences, with positive effects for the people of Colombia.

According to the Organization for Economic Cooperation and Development (OECD), research and experimental development encompass creative and systematic work carried out with the aim of increasing the body of knowledge and conceiving new applications based on the existing knowledge base (2). On the other hand, innovation is understood as the implementation of a new product, service or process, or a substantial improvement, or new methods of organization in the workplace, or in external relations (3). To begin with, I will focus on the disease conditions that could be the focus of basic, applied or psychosocial research, and which could be at the core of technological, educational, organizational or social innovation. I will then propose other criteria that should be considered at the time of identifying priorities.

Regarding disease conditions, the document "How to promote access to medical technologies and innovation" published in 2013 by the World Health Organization (WHO), the OECD and the World Intellectual Property Organization (WIPO), described that the disease burden in medium income countries, apart from comprising chronic non-communicable diseases, not unlike what happens in high income countries, also had a high component of HIV/AIDS, tuberculosis and road accidents, while in low income countries, the main cause of morbidity continued to be infectious diseases (4).

In Colombia, one of the most inequitable countries in America according to the World Bank (5), there are marked health differences across regions, with levels of morbidity and health indicators similar to those of high income countries in some regions while, in others, levels are comparable to those found in African countries.

Some mortality indicators serve as examples. The maternal mortality (MM) rate in 2017 was 50 x 100,000 live births (6); however, in departments

such as Chocó or Guajira, the MM rate is 4 to 5 times higher, while in Bogotá or Valle del Cauca, it is half that number. An analysis of the causes of maternal mortality reveals that preeclampsia continues to be the first cause of death, followed by childbirth complications, possibly hemorrhagic. Basic, applied and social research is needed in preeclampsia given its unknown etiology and the fact that there are no preventive or curative treatments apart from terminating the pregnancy. As for bleeding, innovation in work organization is required in order to provide better services to the women during delivery.

In terms of child mortality, the national rate in 2017 was reported at 10.7 x 1000 live births, the main causes being perinatal mortality - associated mainly to prematurity and low birth weight - and congenital malformations, followed by acute respiratory infection and parasitic and infectious diseases (7). The field of pediatric health requires basic, applied and social research on how to prevent pre-term delivery, as well as social, technological and educational innovation on how to provide and adequately use drinking water in order to prevent many infections. Dengue, malaria and zika are still persistent problems (6). In all of these disease conditions, which also affect low income countries, the most affected populations are the poorest, those living in rural areas, people of African descent, and indigenous populations.

In terms of chronic conditions, the primary causes of death in Colombia are acute myocardial infarction and cerebrovascular disease, followed by homicides, road accidents, arterial hypertension, and chronic obstructive pulmonary disease (COPD) (8). As far as the incidence of cancer is concerned, highest on the list are prostate, breast, colorectal, gastric and cervical cancers, all of which are shared with high income countries (9).

What are other considerations needed to establish priorities in research, innovation and development? Availability of resources is paramount. In this regard, Colombia's biodiversity ought to be considered a differentiator in the world when it comes to the search for new drugs. Another factor to consider relates to the new trend in medicine in high income countries, focused on the use of genomics, gene therapy, proteomics, epigenetics, and biologics which have gone a long way in changing the clinical course of some diseases such as hepatitis C, some types of leukemia, or orphan diseases, albeit at outrageous prices in many cases (10).

In the current practice of medicine, we face two important but partially contrasting trends: on the one hand, health promotion and preservation and disease prevention and, on the other, the use of more sophisticated diagnostic methods and medications focused on personalized medicine. In the former, the thrust is to work on the prevention of alcohol and tobacco use, address bad eating and living habits, combat inactivity, and prevent environmental deterioration (4). These factors are at the root of many chronic non-communicable diseases which, by 2030, will be the main cause of morbidity in all regions of the world with a high proportion of elderly people. Achieving the objective through that approach requires innovations in education during the early years, a time when brain development is at its peak, or during the teenage years, in order to ensure that children will learn healthy eating habits, and adopt health life styles in a healthy environment. This would have a significant impact on the prevention of cardiovascular and metabolic diseases, COPD, and some of the most frequent forms of cancer. Another option would be to use our resources to study the development of new drugs for the most prevalent conditions, or develop the capability to produce biosimilars in order to lower the prices of these medications, as is being done by Brazil and India.

Faced with the need to allocate health science and technology resources, the suggestion could be than some be geared towards studying the disease conditions inherent to our population, where the social burden is substantial, and which would be of little interest for high income countries. Disease conditions such as preeclampsia, dengue, malaria, Chagas and leishmaniasis could be allocated funds for research

from the perspective of basic science (genetics, molecular biology, etc.) as well as applied research for the development of vaccines or new drugs sourced from our own biological diversity. This would require our university and public teaching hospitals to have the ability to carry out clinical research on new drugs for local development. Quality and safety standards would need to be enhanced in our public healthcare institutions, another area of significant inequity in Colombia. On the other hand, research in social sciences and neuroscience would also be needed in order to determine how to reduce the levels of violence, teenage pregnancies or mental illness in Colombia.

As for other conditions affecting us, there is a need to invest in innovation projects designed to streamline access to basic health services (acute diarrheal desease or acute respiratory infection in children) or enhance care processes (safe pregnancy termination, cancer). On the other hand, aging should prompt us to work on innovations around the so-called assistance technologies to enhance autonomy and wellness through such things as prostheses, reminders, apps for remote home care, smart garments, etc. (11).

It behooves us to determine whether, as Colombians, we want to build a future where we can overcome those factors that have been at the root of poverty and its consequences with the help of research and technological development, so as to enjoy equity and wellness and live in harmony with our fellow human beings and nature and finally come to the end of life with dignity; or whether we decide to gear scientific and technological development towards the quest for immortality and eternal youth.

The selection of an emblematic project for Colombia to be developed over the next 20 years has been proposed. It could revolve around the reduction of infant or maternal mortality down to the levels prevailing in high income countries, or the reduction of the incidence of diabetes, obesity, hypertension, cancer or mental illness. Converging technologies, basic science, social science, culture, and biotechnology would be the underpinnings and tools for bringing such a project to fruition. This requires an overarching agreement among all sectors of society and areas of knowledge to ensure convergence on projects that will secure wellbeing and a life in peace for us all.

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