PROSPECTS FOR VACCINE DEVELOPMENT IN LATIN AMERICA

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I. Summary

The establishment of a Regional System for Vaccines (SIREVA) for Latin America offers the possibility of strengthening and expanding universal vaccination programs and, at the same time, establishing a suitable mechanism for stimulating biomedical, epidemiological, and health systems research in the Region. Scientific, technological, and health promotion policies in Latin America and the Caribbean are particularly favorable for the development of SIREVA during the 1990s.

II. Background

In 1988, a group of scientists who met in Rio de Janeiro on the initiative of PAHO and the Rockefeller Foundation reviewed the outlook for vaccine development in Latin America during the 1990s. In spite of the uncertainty and economic difficulties that affected the Region so seriously in the 1980s, a feasibility study was recommended for the establishment of a regional vaccine development network. This recommendation was based on an analysis of the foreseeable opportunities and obstacles of such an unprecedented enterprise for health promotion in the Region through research.

III. Obstacles

Among the problems that must be resolved in order to successfully implement a regional program for research and development (R&D) in new vaccines for Latin America and the Caribbean are the following:

(a) The failure to include health science and technology projects in social and economic development programs in the countries of the Region (1).

(b) The predominance of scientific and technological research based on individual interests, rather than on the attainment of common goals for the improvement of health. Though made more than a quarter of a century ago, PAHO's assessment remains valid:

"One of the characteristics of biomedical research, which is as predominant as it is harmful, is the lack of organization and coherence. Excessive organization presents clear dangers, but science in Latin America suffers from ineffective organization. The individual interests of each person, the fragmentation of the
university as an institution, the lack of coherence in scientific activities on a national scale, and the deficiencies in the area of international cooperation are all evidence of insufficient organization in different areas."(2)

(c) The inadequacy of the Latin American scientific system. After a promising decade in the 1970s, it collapsed the following decade, as proven in the case of Mexico by the estimated 45% reduction in biomedical scientific production in international journals for the 1978-1987 term as compared to the 1968-1977 term (3).

(d) The scarce overall resources available for research on the health problems of the developing countries. According to the findings of the Committee on Health Research for Development, 93% of the potential life-years lost occur in the non-industrialized countries, but those countries have only 5% of the total global resources available to them for health research (4).

(e) The lack of a strong background in scientific and technological cooperation in the Region.

(f) The inability of the majority of the Latin America countries during the 1980s, not only to prepare new vaccines, but also to produce the already existing ones in the quantity, quality, and at the low cost required to accomplish the goal of universal vaccination of children.

(g) The lack of systems for recording accurate, current morbidity and mortality rates.

(h) The increasing difficulty of effective communication between the countries of the Region due to deficiencies in the mail, telephone, and other systems.

IV. Opportunities

(a) As a group, infectious diseases continue to cause a high rate of mortality and morbidity in Latin America (5). The most effective means for preventing several key infections is the development of new vaccines.

(b) Recent scientific advances in the fields of immunology, structural biology, and molecular biology offer excellent prospects for the design and preparation of new or more effective vaccines.

(c) The success during recent years of the global program for the universal immunization of children (6).

(d) The World Declaration on the Survival, Protection, and Development of Children promoted by UNICEF (7), which offers valuable political support to infant mortality reduction programs.
(e) The explicit recommendation by UNESCO to actively promote cooperation and the integration of science and technology in Latin America and the Caribbean (8).

(f) The lack of commercial interest on the part of the large pharmaceutical companies in generating research and development for new vaccines (9), allows the countries of the Region to make a concerted effort to obtain the vaccines of the future. A similar undertaking in the area of drugs, for example, would be doomed to failure by the political pressure exercised on the part of international pharmaceutical consortiums.

(g) The recommendation by the Institute of Medicine of the Academy of Sciences of the United States of America to expedite development of 19 new vaccines to control infectious diseases prevalent in the developing countries based on an in-depth review of the relevant biomedical, epidemiological and technological factors (10).

(h) The possibility of reactivating biomedical, epidemiological, and health systems research in Latin America through the definition of a specific, ambitious, and significant goal that may serve to stimulate scientific and technological cooperation among the countries of the Region. A successful R&D project in new vaccines could not only contribute to the prevention of infectious ailments that cause significant morbidity and mortality, but could also provide a concrete example of the usefulness of scientific and technological research for the well-being of the inhabitants of Latin America and the Caribbean. That would increase the demand for scientific and technological research in the area of health, which at present are not included in social development (11,12).

V. SIREVA: A viable project.

During the three years that have passed since the initial meeting in Rio de Janeiro, PAHO has coordinated a feasibility study for the development of a Regional System for Vaccines (SIREVA) (13). The objectives of the system are: to develop new vaccines necessary for the control of some communicable diseases that constitute significant public health problems in the Region; to improve existing vaccines and foster their utilization; and to promote scientific knowledge. In order to accomplish these goals, strategies have been designed based on: the mobilization of human and interinstitutional resources; the coordination of research carried out by already existing institutions; the modernization of scientific and technical programs; and the promotion of technology transfer among research groups, development laboratories, and industry in the Region.
The SIREVA proposal clearly presents its rationale, objectives, strategies, and expected results. In addition, it contains the basis for the institutional and legal structure of SIREVA, and the developmental and operational costs for the system over 10 years. A selection of the vaccines that SIREVA could develop during the initial phase is included: vaccines against *Streptococcus pneumoniae*, *Salmonella typhi* and *Neisseria meningitidis*. The development of a vaccine against the dengue virus has been indicated in the appendix.

VI. Comments on SIREVA

(a) The document could be placed more realistically within the context of the economic, social, and political situation in Latin America and the Caribbean in the previous decade and the present one.

(b) There is a lack of equilibrium between the objectives and strategies on the one hand, and the operating plan on the other. The former are highly ambitious and extremely broad in comparison with the limited framework of the latter.

(c) The training of new scientific and technological professionals is justifiably mentioned in the initial SIREVA proposal, but in the operating narrative of the system this important objective appears to be relegated to a secondary position of importance.

(d) In the document, the advantages for the two host countries are evident; emphasis on the potential advantages for the other countries of the Region in the event that SIREVA is established would also be desirable.

(e) A more detailed analysis of the ethical and legal aspects involved in the utilization of new vaccines than that presented in the document will be necessary.

(f) In light of the objectives for the establishment of SIREVA it may be advisable to provide several supplemental documents: one aimed at national policy-makers and representatives of the industrial sector, another oriented towards scientists and technologists, and a third that contains the administrative and legal structure of the system.

(g) The document could benefit from a more solid scientific rationale for the proposed vaccines, as well as a brief reference to the reason that, in the selected examples, vaccines would be more effective than other control methods (e.g. chemotherapy).

(h) Such an extensive project as that proposed by SIREVA can only become a reality if it is based on a detailed feasibility study of the objectives and budget such as that prepared by PAHO.
Nevertheless, in addition to being an extremely important political project, it is on the cutting edge in scientific and technological terms. Upon presenting the highly detailed scientific objectives, which include not only what types of vaccines should be developed, but also the methodologies and even the basic antigens for those vaccines, an overview is provided that might seem rigid or narrow to biomedical, epidemiological, and health systems professionals. It is doubtful that scientists or technologists at the international level such as those needed for this project, would be willing to participate in a project for which they have not been involved in any of the planning stages. The document, therefore, could allow for the possibility of a more active role by researchers, if not in the decision-making process on types of vaccines, at least in designing them (monoclonal antibodies, recombinant peptides, synthetic peptides, conjugated molecules, etc.), in defining the mechanisms to improve epidemiological records systems and vaccine effectiveness tests, etc.

(i) The selection of vaccines to be developed includes only infections produced by bacteria. While the short-term advantages of concentrating efforts on vaccines that require similar methodologies are apparent, in the long run the exclusion of scientific methods and expertise necessary for the development of vaccines against viral and parasitic infections could place limits on the scientific and technological capacity of the Region. This would make poor use of the experience of the teams of Latin American virologists and parasitologists, several of which are conducting advanced research for the development of new vaccines in areas such as the biology, immunology, and epidemiology of malaria, Chagas' disease, cysticercosis, and amebiasis, with regard to parasitic diseases, and of dengue fever and rotavirus, in the area of viral diseases. The exclusion of parasitic diseases would be unfortunate due to the minimal support given to research. For example, the document of the Institute of Medicine (10) announces an unpublished supplement that would contain an analysis on the feasibility of the development of vaccines against new parasitic infections.

(j) The document could highlight the importance that studies on the humoral and cellular immunological response have for the development of new vaccines, as well as the research on new additives (14). The experience acquired in recent years in the development of vaccines against malaria is highly illustrative in this regard (15).
References


