{No.11 Vol. 146}

Shanghai Center for Pujiang Innovation Forum June.16 2021

2021 Pujiang Innovation Forum Bulletin XI

Vaccines and Global Health

Editor's Note: In 2021 Pujiang Innovation Forum – The Global Health and Development Summit, with the theme of "Vaccines and Global Health", a number of well-known experts and scholars initiated multi-party transboundary dialogues about how to establish a global health governance system with S&T cooperation as the tie to protect the common health, safety and well-being of mankind, and proposed a lot of crucial ideas, and forward-looking and constructive suggestions. This bulletin is a summary based on the reports from the participating guests[1], and is intended for reference.

[1] CAO Jinghua, Executive Director, Alliance of International Science Organizations Secretariat; ZHU Qigao, Deputy Direcrtor-General, Science and Technology Commission of Shanghai Municipality; ZHANG Jie, Senior Commissioner of Lin-Gang Special Area Administration; Steve Davis Senior Strategy Advisor, Interim Director, China Country Office, Bill & Melinda Gates Foundation; GAO Fu, Academician of Chinese Academy of Sciences, Foreign Academician of National Academy of Sciences, and Director of Chinese Center for Disease Control and Prevention; WU Fan, Vice Dean of Shanghai Medical College of Fudan University, Director of Shanghai Institute of Major Infectious Diseases and Biosafety, Member of China-WHO Joint Mission on COVID-19, and Member of the Expert Group of Shanghai Leading Group for the Prevention and Control of the COVID-19 Pandemic; ZHANG Wenhong, Director of the Department of Infectious Disease, Huashan Hospital affiliated to Fudan University, and Head of the National Center for Infectious Diseases, China; Lynda Stuart, Deputy Director, Vaccines and Host-Pathogen Biology, BMGF; Member, CEPI-MOST Joint Scientific Advisory Committee; ZHOU Xiaonong, Professor of the National Institute of Parasitic Diseases, Chinese Center for Disease Control and Prevention, and Researcher of School of Global Health, Chinese Center for Tropical Diseases Research, Shanghai Jiao Tong University School of Medicine; JIANG Biao, Professor of Shanghai Institute of Organic Chemistry, Chinese Academy of Sciences; YUAN Yuan, China Country Representative, Business Development & Commercialization Lead, PATH; YANG Yue, Professor of School of Pharmaceutical Sciences, Tsinghua University.

2021 Pujiang Innovation Forum Bulletin XI

Vaccines and Global Health

Faced with the tough global dynamics of the COVID-19 pandemic, the international community shall give priority to conquering the pandemic and reviving the economic growth as soon as possible. The virus respects no borders, nor does race make a difference. Only with joint efforts can we human conquer the COVID-19 pandemic. Thus, efficient development of vaccines has actually become an important common task related to all humans. In order to address the challenges of the COVID-19 pandemic and prevent and defeat all kinds of infectious diseases in a more effective way, we shall solve the problem of vaccine productivity and distribution, and improve the accessibility and affordability of vaccines in developing countries. For a better future, we shall undertake the shared responsibility of promoting healthy global development. Life safety and good health comprise the foundation of human happiness as well as the premise of overall security and development of humans.

I. The Opportunities for the Biological Industry under COVID-19 Prevention and Control

According to **Steve Davis**, we now realize the importance of vaccines for public health better than ever before, with the fact that our lives are so fragile and the protection from vaccines is necessary.

COVID-19 vaccines were developed in the highest ever speed, which reflected the outstanding result jointly produced by the global science community through innovation and cooperation. However, urgent steps are required to address the global vaccine inequity. Globally, 75% of the COVID-19 vaccines are distributed only in 10 wealthy countries, which may lead to a deteriorating situation with a constantly rising death toll all around the world.

In the opinion of GAO Fu, we shall spare time for vaccine development and space for vaccine companies. As the foundation, science will always give the answer as long as the public take active part and have faith in it. **The relationship between coronavirus and humans could be compared with that between cats and mice. Vaccine serves as a magic key to control COVID-19 pandemic, gives the recovery of economy and productivity a dose of impetus, and acts as a stabilizer to maintain social development. If vaccines are not shared around the world, the world would be shared by viruses. Thus, global vaccine sharing shall be advocated as a part of the solution. It is an important strategy for containing the global spread of COVID-19 to ensure that COVID-19 vaccines are available for and can be widely used in all countries for the global fight against COVID-19 pandemic.**

II. The Influence of the Public Health System on Global Health

In the opinion of **WU Fan**, the "Chinese experience" concerning the pandemic has demonstrated the importance of well-established public health system and social governance system. She summarized "Shanghai's experience" in fighting against COVID-19 pandemic with five words: fast, early, accurate, considerate and comprehensive. "Fast" refers to fast epidemiologic investigations for the identification of the source of infection and rapid screening among key groups; "early" refers to early detection and treatment; "accurate" refers to precise judgment and evidence-based policy implementation; "considerate" refers to humanistic care, livelihood security, anxiety relief and fear elimination; and "comprehensive" refers to the holistic arrangement for prevention and control plans, surveillance sites, measures and procedures, and population coverage. Disease prevention and control system, as the backbone of our public health system, plays four key roles: the scout responsible for monitoring, evaluating and issuing early warning of diseases and health risks; the army responsible for preventing and controlling diseases and intervening in health factors; the fire brigade responsible for handling public health safety risks and emergencies; and the general staff responsible for promoting the continuous transformation of the measures, norms, and standards related to public policies. We shall improve our capacities in five key aspects to promote our public health system: guarantee of public health security; service of disease prevention and control; decisive inspection in laboratories; scientific research into public health; and information utilization and evidence-based decision making. With the concept of "A Global Community of Health for All",

we shall unite as one and realize co-construction and sharing to end the pandemic and cope with the unknown “X”.

III. The R&D Progress on Vaccines in the Current Phase

The first point concerns the prospect and challenges of vaccines inferred from the current COVID-19 prevention and control results. ZHANG Wenhong pointed out that we shall support the development of Chinese vaccine industry and transfer more Chinese vaccines into “global public goods”. Throughout human history, we have been coexisting with numerous infectious diseases as well as viruses, bacteria and fungi. In most cases, after years of co-evolving, diseases root in human society while humans find the way to deal with them. At present, low-income families can’t afford the vaccines beyond the immunization program and children account for a large proportion in the unvaccinated group. Thus, we shall improve the vaccine accessibility and equity to promote the development of public health. Besides, we shall accelerate the implementation of the national immunization program, facilitate the development of vaccine technologies, optimize the vaccine administration procedure and improve the vaccine quality assurance system. “**Let’s get rid of the virus with universal immunization coverage!**” ZHANG advocated.

The second point concerns the R&D progress on mRNA vaccines. Lynda Stuart introduced the actions Gates Foundation has taken to

accelerate the R&D progress on vaccines. As she pointed out, in terms of vaccine development, they give interdisciplinary platform methods the priority, pay much attention to novel technologies and innovative solutions, and are willing to work on long-term projects such as R&D investment in mRNA vaccines. The COVID-19 pandemic has turned the application of mRNA into reality. With these advancements in science and technology, they hope to create more opportunities for global health, save lives in developing countries, and provide validated tools including vaccines, drugs and diagnoses and explore affordable, reliable and groundbreaking solutions with partners. Four goals shall be achieved to fight against the pandemic: paying attention to vulnerable groups; focusing on poor countries; minimizing the socioeconomic impact of the pandemic; and proactively developing therapeutic drugs and vaccines against the COVID-19.

IV. International Cooperation Experience in Science and Technology Innovation in the Healthcare Industry

The first experience comes from Sino-Tanzania Multilateral Malaria Control Program – Shared Experience in Field Trials. In the opinion of **ZHOU Xiaonong**, the key to the prevention and control of malaria lies in 7 aspects: the support from the government; the specialized and customized strategy; the application of demonstrable scientific approaches and innovative methods; the development of relevant skills; the continuous financial investment; the control of

high-risk populations and regions; and international cooperation. We shall share our innovative methods for malaria surveillance with others, especially the “1-3-7” method which has become a model for other countries in terms of malaria prevention and control, and received widespread acclaim even from WHO. We hope that Chinese wisdom and Chinese programs can be widely applied and carried out in Africa, and more and more young people can take active part in global health development programs in the future.

The second experience is derived from the development of drugs based on traditional Chinese medicine for the prevention and control of vector-borne diseases. According to **JIANG Biao**, the wild mosquito populations have become resistant to several pesticides including pyrethroid, organophosphates, carbamate, DDT and dieldrin. Thus, we shall develop novel drugs for the prevention and control of vector-borne diseases. We should give full play to the role of Chinese herbal medicine as a solution to malaria prevention that can effectively kill mosquitos without toxicity. We shall identify the precursors of vector prevention and control on the basis of Chinese herbal medicine while optimizing the active compounds discovered in earlier phases, and finally develop environment-friendly and cost-effective compounds with low toxicity which are more effective to malaria prevention and control.

V. Promote Healthy Global Development with Joint Efforts

Firstly, PATH will work together with China to promote global health cooperation. YUAN Yuan introduced the Program for Appropriate Technology in Health (PATH), a non-profit international organization working on platforms for vaccines, diagnoses, chemical drugs, medical devices and health systems. At the moment, PATH is transferring more and more resources and talents to developing countries, especially to China. Especially, it regards China as an important partner and hopes to promote excellent experience of Chinese health system in malaria containment to African countries. She said that PATH is quite confident that Chinese vaccines will promote global health. PATH also hopes to work with more Chinese partners to accelerate innovation transformation throughout the whole process, from the formation of solutions to the large-scale application, and make contributions to global health.

Secondly, the progress on the Project for the Construction of the Think Tank for the Drug and Vaccine Regulatory Science of Tsinghua University was reported. YANG Yue firstly introduced the drug regulatory science, an emerging subject for global innovation during her presentation. Different from the original pharmacy administration subject, drug regulatory science pays more attention to the science-related aspects of drug administration, particularly to the issues concerning drug administration.

Drug regulatory science focuses more on considering and solving

relevant issues from the underlying scientific logic and eventually developing a blueprint for the future of drug administration. The general focuses of the research into drug regulatory science are the strategic, critical, common and challenging issues in drug administration, especially the key issues which may hinder drug R&D, influence industry development and affect administration efficiency. While promoting vaccine innovation, researchers have conducted researches into the design of clinical trials for vaccines and the use of surrogate endpoints, hoping to promote the development of clinical trials for vaccines.

Summarized by QU Jingjing