

U.S. & China's Interest in the Global Virome Project: an Opportunity for Global Health Cooperation

Summary

- The Global Virome Project (GVP) is a bold, ambitious 10-year 'big science' project to develop an atlas of the planet's naturally-occurring viral threats – driving the advanced development of countermeasures against future pandemics.
- Both the U.S. and China have expressed considerable interest in leading this global effort.
- China aims to launch a partner project, the "China Virome Project (CVP)" as part of the Belt & Road Initiative (BRI) with Chinese government funding to establish a pandemic threat research network among BRI countries.
- The U.S. is considering scientific and development assistance support to the GVP's global operations and affiliated National Virome programs.
- While the GVP will have to navigate complex issues concerning sharing of specimens and data across national borders, China and U.S. interest in the GVP represents a positive indication that health cooperation, safeguarding global health security, and advancing innovation in science presents new ground for potential U.S.-China collaboration.
- Absent U.S.G. leadership in GVP agenda-setting, governance, and funding, the Chinese government could take a leading position in this potentially path-breaking endeavor undermining years of USG leadership and considerable investment. Additionally, limited access to the information gained through these efforts may have serious national security implications.
- By playing a joint leadership role in the GVP, the U.S. and China have the opportunity to push innovations in science, catalyze advances in health science, and promote equitable access to the intellectual property and commerce that will come from it.

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Health Security is a Global Agenda

We are in a pandemic era, where threats posed by epidemics are greater now than ever. The point in human history. These diseases emerge and spread through our globalized travel and trade networks, so that wherever a new virus originates, once it begins to spread it rapidly gravitates to developed countries such as the U.S.A., and rapidly developing countries like China. They cause global mortality (e.g. HIV/AIDS, influenza, Ebola) and over \$2.3 Trillion in projected costs for the next 30 years. The majority of these global threats originate from viruses carried by animals, e.g. HIV-1 from chimpanzees, Ebolavirus carried by bats in Africa. Global trends indicate that new microbial threats will continue to emerge at an accelerating rate, driven by our expanding population, growing interconnectedness, and increasing interactions with animal populations. Despite the potential impact of viral threats, the world remains unable to predict when, where, or from what species the next emerging virus will break out.

Breakthrough work funded by USAID shows that there are around 1.7 million unknown viruses in wildlife, spanning 24 viral families that have the potential to emerge in the future. Compared to the 260+ viruses known from humans, this viral "dark matter" represents 99.9% of the potential pandemic threat. Thus we expect there are likely thousands of unknown "SARS-like", "HIV-like" or "Ebola-like" viruses circulating in wildlife that could threaten human health. Currently we are working on vaccines for only a handful of these.

The GVP's Ambitious Goals

The GVP vision is an atlas of the majority of the planet's naturally-occurring viral threats over the next 10 years transforming the world of emerging diseases into a data-rich field. Doing this while these viruses still circulate in wildlife – their natural hosts – means we can better prepare for viruses before they emerge in people and cause devastating outbreaks. To do this will be costly, require work in

multiple countries, and international coordination and partnership to manage the decade-long project work, and support equitable data-sharing and access to benefits. A core group of scientific leaders, including leaders of U.S. agencies, members of the U.S. National Academy of Medicine, and Chinese and international collaborators have published a 10-year workplan to conduct the fieldwork, laboratory analysis and database development that will discover over 70% of the currently unknown viral threats so that we can develop strategies to prevent their emergence.

This work should transform our public health culture from responding to costly and devastating outbreaks, to preventing them. This includes pathogens that might otherwise devastate domesticated animal populations, benefitting global food security and livelihoods of farming communities of the world. The GVP database and atlas will catalyze advances in genomics, modeling, diagnostics, vaccine and countermeasure development and public health. These will include risk stratification of the newly discovered viruses to identify those most likely to threaten our health, and new ways to rapidly develop pan-viral family-level vaccines and countermeasures. With modest investments, this may lead to significant return to the biomedical industry and through benefits to public health.

The GVP requires global stewardship

The GVP looks to the Human Genome Project as a model, in which an ambitious vision led to the development of new technologies and a vast data resource now available to all. Unlike the Human Genome Project, sampling for the GVP will need to be multi-national so that the GVP by nature has an international scope. Rather, the GVP will be a federation of National Virome projects that will contribute to a shared data-portal. Thus GVP faces significant challenges: Who will own the samples that are collected from many countries? Where will they be analyzed? Will all GVP data be freely available to the public? The GVP core group is working on these legal and ethical issues, but without proper stewardship, these could hinder and stifle progress. A partnership involving strong engagement of U.S. and Chinese experts will greatly increase the success of this venture and enable experts to help shape the answers to these critical questions.

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The Global Virome Project Provides China and the U.S. a Platform for International Collaboration

The GVP will, over the course of its lifetime, directly contribute to the enhanced capacities for preparedness and response in over 40 countries across Africa, Asia, and the Americas. The U.S.-China scientific leadership has publicly stated that the GVP is an excellent platform for increased U.S.-China collaboration to combat catastrophic threats at the intersection of animal and human health. It represents an opportunity to harness a cross-section of the very best of U.S. and China's scientific, technical and development assistance leadership to provide both funding and in-kind support. International NGOs and academics are likely to provide partial leadership for the GVP. U.S.-China leadership will need to ensure that their shared interests are adequately reflected in this effort.

The Scope of the U.S.-China Collaboration

Leading institutions in the U.S. and China would collaborate on the GVP at both the international level by supporting global operations of the GVP's central coordinating body or "Hub". At the national level, U.S.-China leadership would support the operations of National Virome projects in countries where diseases most often originate (rapidly developing countries) and which are closely connected to global travel and trade networks. Participants from the U.S. and China have respective strengths and resources that, when coordinated, could achieve greater development and health outcomes. Stakeholders include U.S. federal institutions (e.g. NIH, CDC, USAID), universities, and the private sector, as well as the Chinese federal research institutions (e.g. CAS, CAMS) and government agencies (e.g. NHFPC, CDC, CIDCA). These organizations already have formed collaborative links on a number of public health and

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disease research programs and are ready to coordinate without duplicating pre-existing or separate agreements or arrangements. Their focus will be to:

- Support the technical and operational activities of the GVP Hub, including the managing of the global data-portal.
- Provide technical support to develop human resources, training and field operations of the participating National Virome projects.
- Commit to transparent, coordinated collaboration in building an open-access database of viral information.
- Provide risk ranking information directly to WHO, CEPI and the GHSA so that prevention and control measures can be rapidly coordinated to combat newly identified threats.

By enhancing current collaborative ventures, providing joint support to build the U.S.-China GVP leadership and “hub”, we will be able to rapidly move from waiting for the next pandemic to hit, to a state of global preparedness and prevention – the beginning of the end of the pandemic era.

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