A conversation with David Relman on February 12, 2014

Participants

- David Relman — Professor of Medicine and Co-Director, Center for International Security and Cooperation, Stanford University
- Alexander Berger — Senior Research Analyst, GiveWell

Note: These notes were compiled by GiveWell and give an overview of the major points made by Professor Relman.

Summary

GiveWell spoke to Professor Relman to learn more about opportunities in biosecurity. Conversation topics included natural and man-made biological risks, areas of biosecurity that could use more work, and sources of funding.

Overview of biological risks

Life science research is in a revolutionary period that began in the 1950's and accelerated in the 1970's with the development of recombinant DNA technology. Today, the discovery of new biological capabilities is growing exponentially, and more people are capable of using biological agents for a greater number of purposes. Although most of these uses are positive for society, the potential for harm has increased over time. An individual bioterrorist is now capable of doing more harm with a biological agent than most organizations could have done in the past. Since smaller groups are easier to muster and radicalize, this means that the risk of dangerous misuse has risen.

In general, so far, natural threats (such as flu pandemics) have been a greater cause for concern than man-made threats. Natural threats will continue to pose serious threats. However, over the next five to ten years the risk of man-made threats will likely continue to increase, and the distribution of risk will begin to tilt more in that direction. In the near term, the greatest man-made biological risks are more likely to result from deliberate, directed manipulations of existing agents than from *de novo* synthesis of novel agents.

Mitigating risks

Capability and intention are required for bioterrorist attacks to occur. An effective defense against biological risks involves multiple, simultaneous approaches to confront both the capability side and the intention side. To improve biosecurity, there is a need to:

1. **Generate awareness about the potential risks of life science research and establish norms that limit those risks.** Widespread awareness of biological risks will strengthen global response networks, leading to faster detection and mitigation of biological threats. In particular, this work might involve:

- Encouraging researchers and funders to acknowledge that there may be types of research that should not be undertaken because the potential risks outweigh the potential benefits. For example, scientists should not test the possibility of creating a highly transmissible and drug-resistant version of a a highly pathogenic infectious agent (especially because there may be less risky ways to study transmissibility). There is some concern that scientists are already doing research that would not pass a cost-benefit analysis. It will be difficult to get researchers and funders to engage in conversations that could limit research. Last year, conversations about limiting "gain of function" research were met with hostility. Some progress may be made by mobilizing important figures in the life science research community to support this kind of conversation, and by having dispassionate discussions of immediate and direct risks and benefits.
- Making the conversation more multi-disciplinary by engaging professionals in related fields, such as law, technology, and business. Think tanks, foundations, and university programs such as the Center for International Security and Cooperation (CISAC) at Stanford, which Professor Relman co-directs, could advance this effort.
- Developing systems to ensure that sensitive information is shared in responsible ways. There are cases in which information about engineered infectious agents should not be distributed widely. For example, the recent discovery of a new type of botulinum toxin was shared with a limited group of experts so that a countermeasure could be developed, while at the same time, the likelihood of misuse of the information would be lessened.

2. **Develop better regulatory systems.** The National Institutes of Health (NIH) funds most of the current work on regulatory systems. Existing systems in the U.S. and many other countries focus too narrowly on compiling a list of important infectious agents and should be expanded to respond to a wider range of threats. In particular, this work might involve:

    - Monitoring dual use research according to risk level. The National Science Advisory Board for Biosecurity (NSABB) has suggested assessing risk, based on the functions of organisms being studied and the potential consequences of their release. This makes sense theoretically, though seems to be extremely difficult to apply in practice given our current level of knowledge about the potential consequences of different genetic modifications.
    - Developing the capability to predict functions from genetic sequences. This capability would eliminate the need to identify specific organisms for regulation. At the moment, researchers are only able to do this in limited contexts.
    - Diversifying the conversation around regulatory and governance systems . The conversation has been dominated by the NIH and influenza researchers

and should be expanded to include researchers in other areas of life sciences, as well as in other disciplines, including the social sciences. Philanthropists could help expand the conversation by funding workshops, commissioning think pieces, and supporting proposals for new academic programs.

- Organizing conferences. The Asilomar Conference on Recombinant DNA in 1975 successfully convened a diverse group of about 140 professionals, clergy, and communication specialists to discuss emerging biological risks and appropriate regulatory systems. It is much harder to organize conferences of this scope today because relevant fields are much larger, but it might be possible to do this for more narrow fields.
- Further encouraging the use of biosafety panels and expanding their scope, or creating analogous panels focused on biosecurity. Most biotech companies manage their own biosafety panels or use local ones, though this is not required by law.
- Learning from and coordinating with efforts to regulate emerging technologies in other fields, such as nuclear and cyber security. Non-profit and private sector groups, including Silicon Valley professionals, could make important contributions in this area.

Sources of funding

Several foundations, including the Alfred P. Sloan Foundation and the Carnegie Corporation of New York, got involved in biosecurity in the early 2000's, following anthrax attacks and an increase in U.S. biosecurity funding. These foundations have largely ended their biosecurity programs, although there is much more work to be done.

CISAC was founded to do work in nuclear security and nonproliferation, with funding from foundations including the MacArthur Foundation, the Carnegie Corporation, and the Ford Foundation. CISAC is interested in broadening its mission but currently receives little funding for biosecurity; Professor Relman is beginning to look for sources of funding in this and other new mission areas.

Who to talk to next

- Roger Brent, Principal Investigator (PI) at the Fred Hutchinson Cancer Research Center. Dr. Brent does basic research in molecular biology and has been involved in discussions about biological risks and regulation for many years.
- Tom Inglesby, Director of the UPMC Center for Health Security.
- David Franz, former Commander of the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID). Dr. Franz has been involved in international bio-engagement programs at the U.S. Department of State for many years.

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