James Le Duc, Cooperative Threat Reduction Programs for the Next Ten Years and Beyond
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The Proliferation of Technical Expertise in Biological Sciences

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Overarching Issues

Technical excellence in biology exists in many countries around the world

USA leadership in biology is being threatened

Future CTR engagement might include international collaborations that are designed as true partnerships between equals

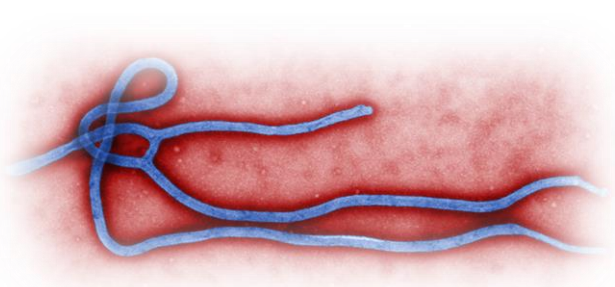
- Shared intellectual input
- Shared costs
- Shared credit

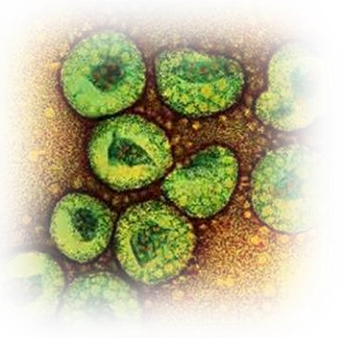
“Traditional” biological threats remain important, but novel threats must be considered

Overarching Issues (2)

Emerging Infectious Diseases represent a valid threat to national security affecting not only human/animal health, but also impacting domestic economy and creating social disruption

- West Africa Ebola
- SARS





Novel threats include

- Emergence of novel naturally occurring pathogens: pandemic influenza, MERS, new world hantaviruses
- Man-made products resulting from gain-of-function/loss of function studies, synthetic biology and other products from biotechnology

Changing Landscape of Where Biological Research is Being Done

Global proliferation of biocontainment laboratories—BSL4 labs in:

- China (3 about to open: Wuhan, Kunming, Harbin)
- India (Pune opened in 2012)
- Gabon
- South Africa
- Russia
- Canada
- Australia
- Several in Europe
- Considering construction is Japan, S. Korea, Vietnam, others?

Unknown number of BSL3 labs in many countries including Laos, Cambodia and others

Global Proliferation of Biocontainment Labs—Impact of Training Programs

Past investments to enhance biosafety and biosecurity programs around the world have been impactful → national and regional biosafety management associations

Continuing need for training in biosafety and biosecurity

- Need to create a culture of safety and responsibility among staff and leaders
- Cannot rely on short-term courses—suggest in-lab mentorship programs

Need for training of building engineers and lab operations managers

- Complex infrastructure requires special skills not easily acquired
- Share best practices to address technical questions and resolve problems
- Addressing costs of operations in resource-limited countries

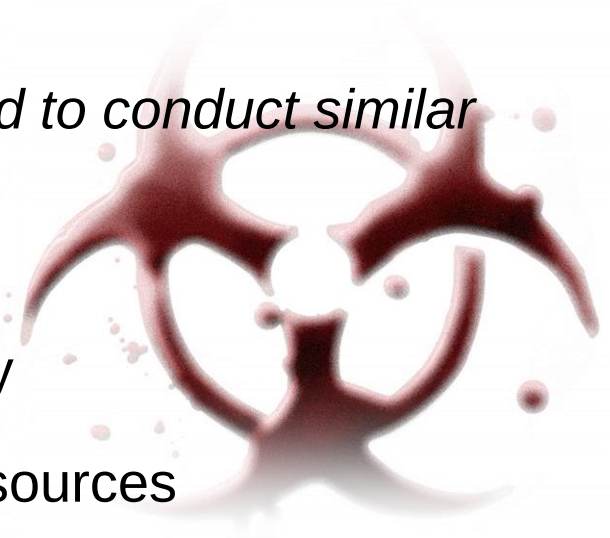
Need for strong, experienced leaders to direct biocontainment labs

- *How to prepare the next generation of leaders?*

Changing Focus of Biomedical Research

"Gain of Function" studies, the avian influenza example

- Addressed a valid scientific question of public health importance
- Work was conducted in BSL3 ("enhanced") laboratories
- *Are other BSL3 laboratories around the world adequately prepared to conduct similar experiments?*



Synthetic Biology, gene drive and other cutting edge advances in biology

- Example of recreation of horsepox virus using widely available resources
- *How can we ensure that the work is done safely and securely?*
- *How can we guard against accidental or intentional release into the community?*

Considerations for CTR of the next decade

Evolve from **paternalism** to **partnerships**; recognize and embrace strengths of others

Foster **long-term relationships** between individual scientists and institutions, especially in laboratories designed to handle dangerous pathogens

Encourage **joint research** and development project design and implementation by collaborators from partnering organizations

Create mechanisms to allow **joint funding** by all countries involved

Promote **personnel exchanges** bilaterally between collaborating labs

Create and sustain a strong foundation in **biosafety and biosecurity training**

Considerations for CTR of the next decade

Establish **longer term** (months to years) exchanges of investigators working in biocontainment facilities

- Allows junior investigators to gain mentored experience under tutelage of senior scientists
- Encourages modeling of best practices at all levels of biocontainment operations

Attempt to **address regulatory challenges** to international collaborations

- Visa issues (both ways)
- Select agent regulations
- Export Control regulations

Benefits of Joint Research

Places programmatic focus on biocontainment labs where the greatest concern exists

Allows supported investigators to model best practices relevant to CTR

Builds lasting personal friendships and institutional linkages

Increases transparency (bilaterally)

Provides a conduit for mutually beneficial exchange of ideas, reagents, techniques and personnel

Results in better science for all involved