

Bioterrorism and Public Health

D.A. Henderson, MD, MPH
Harvard Center for Population and
Developmental Studies

Boston
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Biological Weapons

- A threat, largely ignored until 1995
 - Too difficult to grow organisms
 - A problem to disseminate
 - A moral barrier against use
 - So destructive as to be unthinkable

Biological weapons – 20th C.

- 1940-44 – Japanese Army – Unit 731
 - **Attacks on Chinese cities**
Anthrax, botulism, brucellosis, cholera, dysentery, gas gangrene, plague, paratyphoid, typhoid
- 1942-- ? Soviet use of Tularemia at Stalingrad
- Research and Development Programs in major countries, incl. US, UK, Australia, USSR

Biological weapons

1972 – A watershed year

- **Biological Weapons Convention –1972**
 - Countries pledge to destroy weapons and cease research on offensive weapons
 - Signed by US, UK, USSR, Iraq, et al
 - No provision for verification

US activities re: bioweapons—pre 2000

- US Military
 - R & D for defensive purposes
 - A steadily diminishing budget
- Academia -- Medicine and Public Health
 - Research programs dealing with biological or chemical weapons generally rejected
- CDC and NIH – nothing
- Research on exotic disease (potential candidates)
 - Extremely limited

1995 Critical Events

Iraq

- **Hussein Kamal deserts**
 - Research reports reveal a much more extensive and sophisticated program than UNSCOM had uncovered
- **Concern: If so much activity could continue undiscovered despite intelligence, how many other countries might be similarly engaged?**

1995 Critical Events

Aum Shinrikyo (Japan)

- Religious cult releases Sarin gas in Tokyo subway
 - Cult - previously unknown to intelligence
 - Thousands of members, well-funded
 - Tried to aerosolize anthrax and botulinum toxin throughout city at least 8 times
 - Organized team to Congo to obtain Ebola virus
- Concern - unknown, non-state sponsored organization, acting without concern for possible moral deterrents

1995 Watershed Events

USSR

- 1972 - Bioweapons Program intensified
- 1989 - First knowledge of Program in West
- 1992 - Ken Alibek, Deputy Director of USSR Program, deserts to US
- 1992 - President Yeltsin admits that USSR has a program and that Sverdlovsk anthrax epidemic was due to a lab accident

"On May 8, 1980, WHO announced that smallpox had been eradicated..Soon after, smallpox was included in a list of biological weapons targeted for improvement in the 1981-85 Five -Year Plan..

Where other governments saw a medical victory, the Kremlin perceived a military opportunity...the military command issued an order to maintain an annual stockpile of 20 tons (of smallpox virus)."

Alibek, 1998

Russia and bioweapons

- Previous Bioweapons Program (50+ labs and 60,000+ persons) is reduced in scale. Less than half of the scientists are still employed.
- The major production lab for smallpox virus, at Sergiyev Posad, remains a secret facility
- Former Vice-Minister of Health Burgasov admits (2002) aerosolized smallpox was tested on Voz Island in 1971

Criterion Rating of Bioagents

Anatoliy Voroboyov -April 1994

- | | |
|------------|----|
| ■ Smallpox | 26 |
| ■ Plague | 23 |
| ■ Anthrax | 21 |
| ■ Botulism | 21 |
| ■ VEE | 20 |
| ■ Q fever | 20 |

Bio Agents of Greatest Concern

US Category A agents

- | | |
|------------|----------------------|
| ■ Smallpox | ■ Tularemia |
| ■ Anthrax | ■ Botulinum Toxin |
| ■ Plague | ■ Hemorrhagic fevers |
| | Ebola, Marburg, etc. |

Source of Agents

- Naturally occurring pathogens
 - Anthrax, plague, tularemia, C. botulinum
- Diagnostic laboratories
 - In 2002, anthrax available from 46 labs
- Former Soviet bioweapons labs

Production of agents

- Until 2002, detailed instructions for production available on the internet
- Equipment – inexpensive, dual use
- Space needed – minimal
- Size of staff -- small

Disseminating an Agent

- Water
- Food
- Aerosol
 - Ventilation systems
 - Crop dusters, back pack sprayers
 - Inhalers for asthma

Policy decision Nature of Public Health response

- Development of sustainable systems for dealing with catastrophic events of whatever cause
 - Biological – deliberate and natural
 - Nuclear –
 - Chemical
 - Explosives
 - Major accidents (e.g. plane and train)
- None of these problems are going to go away

Essential elements for response to a BW event - I

- Comprehensive plan including civil authority, public health, hospital, law enforcement, voluntary agencies, others
- Early detection and diagnosis
 - Emergency room personnel
 - Infectious disease specialists
 - Laboratory
- Vaccines, drugs, diagnostics

Essential elements for response to a BW event - II

- Communications network – 24/7
- National/state Surveillance Centers
- Training programs
 - Medical, public health
 - Civil authorities
 - Hospitals

Newly Emergent Challenges

- West Nile encephalitis – U.S.
- Foot and mouth disease
- Monkeypox
- H5N1 influenza
- SARS

A Fertile Ground for New Microbial Agents

- Rapidly growing urban populations
 - 1800 2 %
 - 1950 20 %
 - 2010 67 %
- Urban areas with large populations
 - >7.5 million – 1950 – 2 cities
 - 2003 – 30 cities
 - >15 million – 2003 -- 7 cities

Other contributory factors in new agent transmission

- International travel
- Hospitals
- An industrialized and internationalized food supply

Longer-term Solutions

- Better global knowledge of diseases and possible terrorists
 - International surveillance
 - Intelligence
- Expanded research program for infectious diseases – an international scientific network
- An international consensus and moral suasion.

Longer-term solutions

- New relationships and new mechanisms to facilitate industry, government and academia collaboration, especially under epidemic threat conditions to produce vaccines, anti-microbials and diagnostics
- Mechanisms for better international and intergovernmental cooperation

- *Man's only competitors for the dominion of the planet are the viruses – and the ultimate outcome is not foreordained.*

Joshua Lederberg