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Appreciation for invitation and special recognition

comment for recognition of ~~public~~ challenges and opportunities as early as you did.

DEAN <sup>3/20/07</sup> <sup>originally</sup> Center for Biodefense and Emerging Pathogens -

I had thought to focus predominantly on smallpox but since corresponding with Andy

about a ~~not~~ visit at this time. Has become apparent that there are no biological

weapons to be found in Iraq. ~~While~~ ~~the~~ ~~many~~ have come to understand smallpox

does not spread so rapidly as measles or influenza - primarily because it spreads

until 50s. and vaccine can be given even 2-3 days after infection + prevent.

Some have questioned - so why should we now be concerned about this?

Let me therefore walk you thru the ~~steps~~ reasons why beginning in ~~the~~ <sup>the late</sup> 90s, this was

a growing concern and why, in fact, today, the concern, if anything is more serious.

## The Smallpox Chronicles: Chapters yet to be Written

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**Medicine in the Age of Bioterrorism**

Providence, Rhode Island  
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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 – 20<sup>th</sup> 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 pledged to destroy weapons and cease research on offensive weapons
  - Signed by US, UK, USSR, Iraq, et al
- Academia -- Medicine and Public Health
  - Activity of any sort re: biological or chemical weapons shunned
  - Little research on exotic diseases that are prime candidates for use

## 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<br>Ebola, Marburg, etc. |

## Acquisition 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 required– minimal
- Size of staff required -- small

## Methods for Dissemination

- Water
- Food or beverage
- Aerosol
  - Ventilation systems
  - Crop dusters and other ambient sprayers
- Mail system

## Policy decision Overall 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

## Recent enigmas Were they natural occurrences?

- West Nile encephalitis – U.S.
- Foot and mouth disease
- H1N1 influenza
- Canine parvovirus
- Coronavirus

## 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**

## Transmitters of New Agents

- International travel
- Hospitals
- An industrialized food supply

## Longer-term Solutions

- Better global knowledge of diseases and possible terrorists
  - International surveillance
  - Intelligence
- Expanded research program for infectious diseases
- 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