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Introduction and Overall Challenges to Microbial Risk Assessment

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Anthrax Letters of 2001



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1918 Flu Pandemic



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Foot and Mouth Disease



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What's the RISK question?

Prospective
Probability X Consequence

- to assess the probability of a (similar) event occurring
- to assess the potential needs for medical countermeasures
- to identify the data gaps for future R&D budgets

Retrospective
Pathogenicity X Exposure

- to identify the population exposed for medical treatment
- to quantify the extent of contamination for remediation

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Prospective
Probability X Consequence = RISK

Probability depends on:

- Availability of agent
- Outbreak history
- Capability of adversary
- Past terrorist use
- Agent characteristics
- Existing security

Consequence depends on:

- Toxicity of agent
- Amount of agent
- Contagiousness
- Impact on infrastructure
- Availability of treatment
- Ease of detection
- Ease of dissemination
- Ease of decontamination

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Prospective
Probability X Consequence = RISK

Probability depends on:

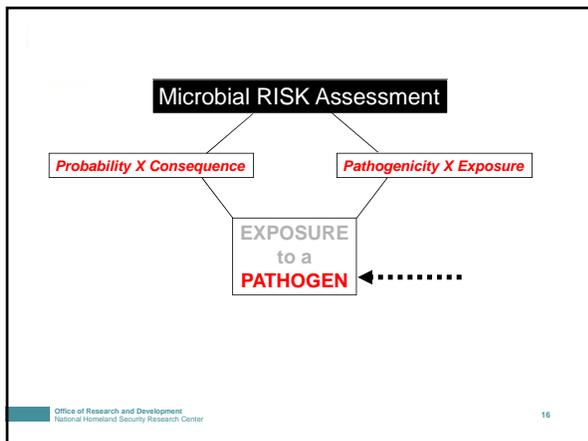
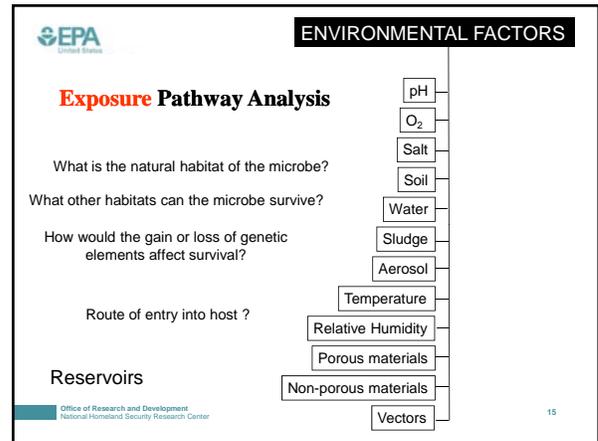
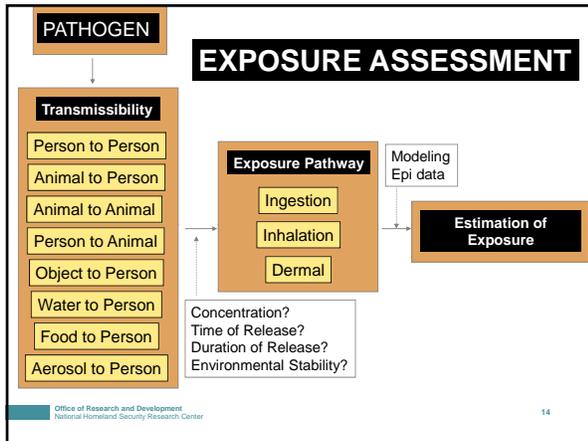
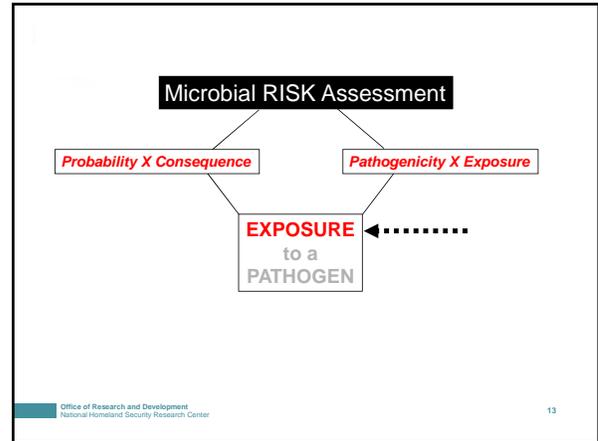
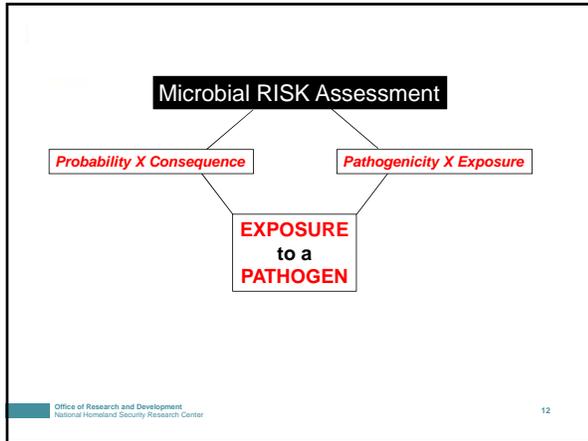
- Availability of agent
- Outbreak history
- Capability of adversary
- Past terrorist use
- Agent characteristics
- Existing security

EXPOSURE to a PATHOGEN

Consequence depends on:

- Toxicity of agent
- Amount of agent
- Contagiousness
- Impact on infrastructure
- Availability of treatment
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What makes a biological agent pathogenic?

Virulence factors

Agent Preparation

Transmissible

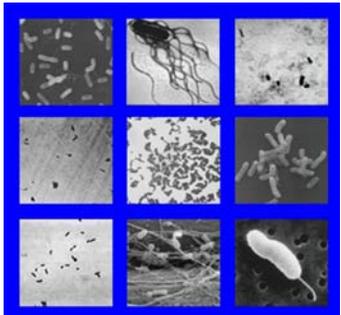
Viable

Other Factors:

dose

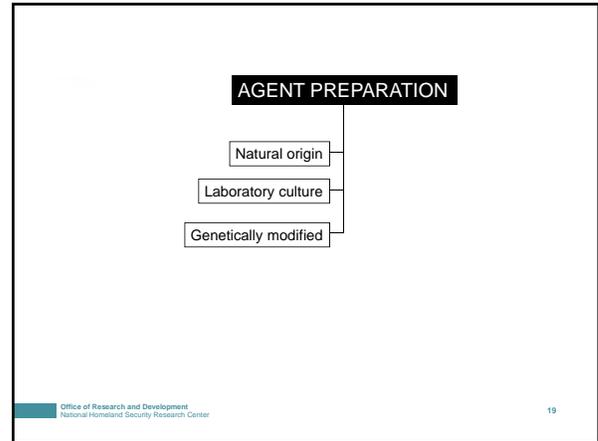
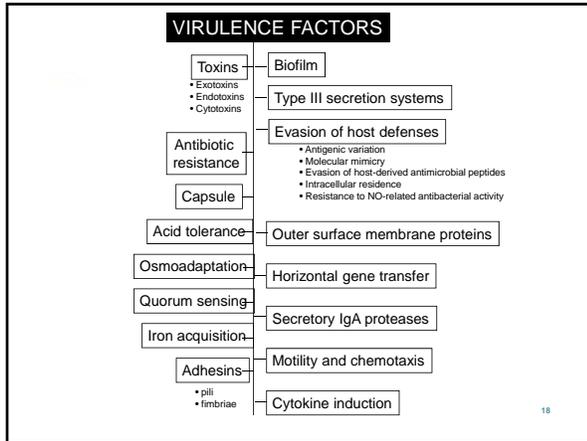
exposure pathway

host immune status

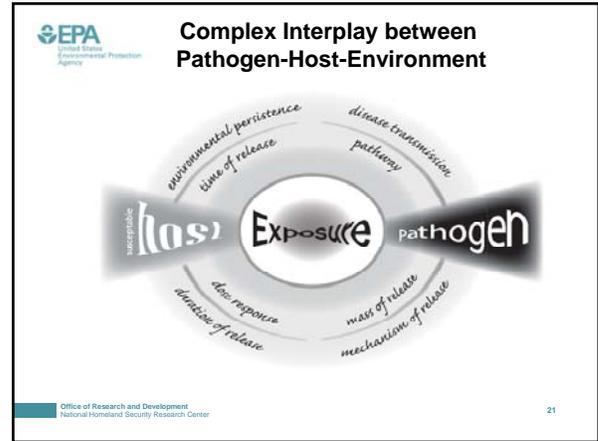


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- ### Additional Complexities:
- Different strains of agents
 - Difficulty in detection
 - Different exposure scenarios
 - Different host susceptibilities
 - Different health effects
 - Different presentation of symptoms
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- ### Microbial Risk Assessment
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- **What do we know?**
 - **What information can we use?**
 - **What are the research gaps?**
 - **What are the uncertainties?**
 - **How do we proceed?**
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