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Biological Security Capabilities

Capabilities that

Predict Emergent Threat

Prevent Threat

or

Detect Threat

Neutralize Threat

Mitigate Threat

BioDefense and Public Health Opportunities

- Detect threat agents and host response
- Identification of Animal and Plant Sources (biocompatible taggants) for tracing custody
- Data for Rapid identification of people to support emergency response care/security
- Sensor Systems, Coordinated Communication, Multi-national Response Capability

Countermeasure Elements

- Prediction
 - Emerging disease (Human, animals, plant)
 - Intentional dissemination
- Detection
 - Multi-array sensors (low false + or -)
- Prevention or Mitigation
 - Pharmaceutical stockpile including antibiotics and anti-virals

International Activities

- Integrate change in disease incidence, weather, region of outbreak (utilize multinational cooperative efforts)
- Establish multi-national cooperative efforts between FDA like agencies to detect threat emergence (e.g. heparin, melamine problems)
- Establish trusted relationships between National and Federal Science Agencies to manage emergence of threats whether intentional or not

Elements of Data to Action

- Data
 - Sensors (point and stand-off)
 - Common Integrated Intel (all elements)
 - High fidelity communication
 - Secure sharing and processing
- Conversion to Information (Autonomous)
 - Data mining and fusion
 - Weighting factors (intelligent agent, credibility)
 - Time dependent
 - Data Re-fusion (new inputs continually alter threat)
- Action
 - Executive Officer, Operator and Consequence Manager

Applicable Capabilities

- Genomic sequences of pathogenicity islands and threat agents
- Antigenic determinants of critical agent antigens involved in binding target
- Multiplexed sensor platforms
- Secure telecommunications assets
- Archival health data sets and electronic medical records

Applicable Technologies

- Handheld sensor platforms that incorporate sample capture, binding materials and transmitter (e.g. personal sensor)
- Biological agent sensor platforms embedded in hospital toilets; includes high affinity binders and transmitters
- High Affinity immune based binders ($K_d=10^{-13}$) for infectious agents (could be on replaceable cassettes)
- Secure transmission of electronic symptomatic disease for comparison with archival data set
- World wide surveillance of emergent diseases including anthrax, SARS, West Nile Fever, Congo Crimean Hemorrhagic Fever, smallpox

Needed Databases

- Critical genomic sequences
- Critical proteomic data
- Normal disease incidence
- Normal pathogen distribution

Benefits

- Early warning of emergent disease on a global basis
- Pre-positioning of health-care providers, pharmaceuticals and materials for containing disease
- Home care of aged and infirm; telemedicine
- Improved community health

Economic and Ethical Issues

Factors impacting on social acceptance

- General concern with government intrusion into personal life
- Concerns between nations that information awareness increases threat potential
- Concerns re: loss of trade (e.g. BSE, SARS, tourism)
- Will false positives from sensors or false accusations compromise economic security

Management of Concerns

- Develop multi-national regulations regarding privacy issues (e.g. HIPAA in US)
- Develop regional regulations that express consensus (e.g. EC)
- Establish probabilistic based international standards regarding threat levels of agents in food, selected environments (hospitals, transportation)