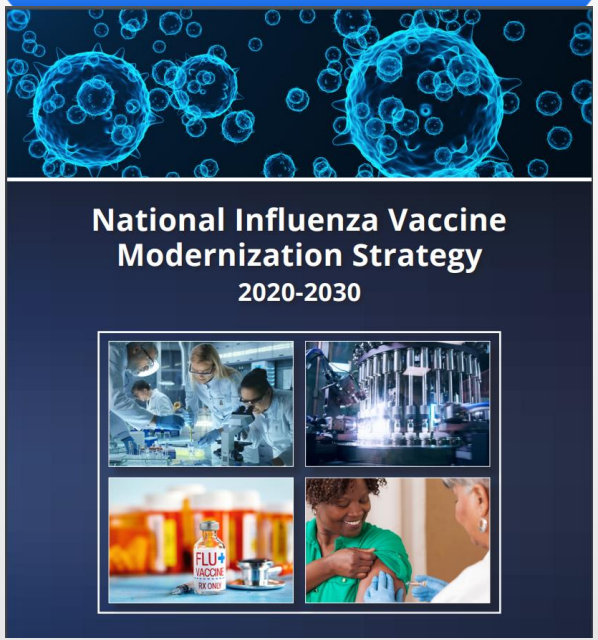
Influenza Vaccine Modernization

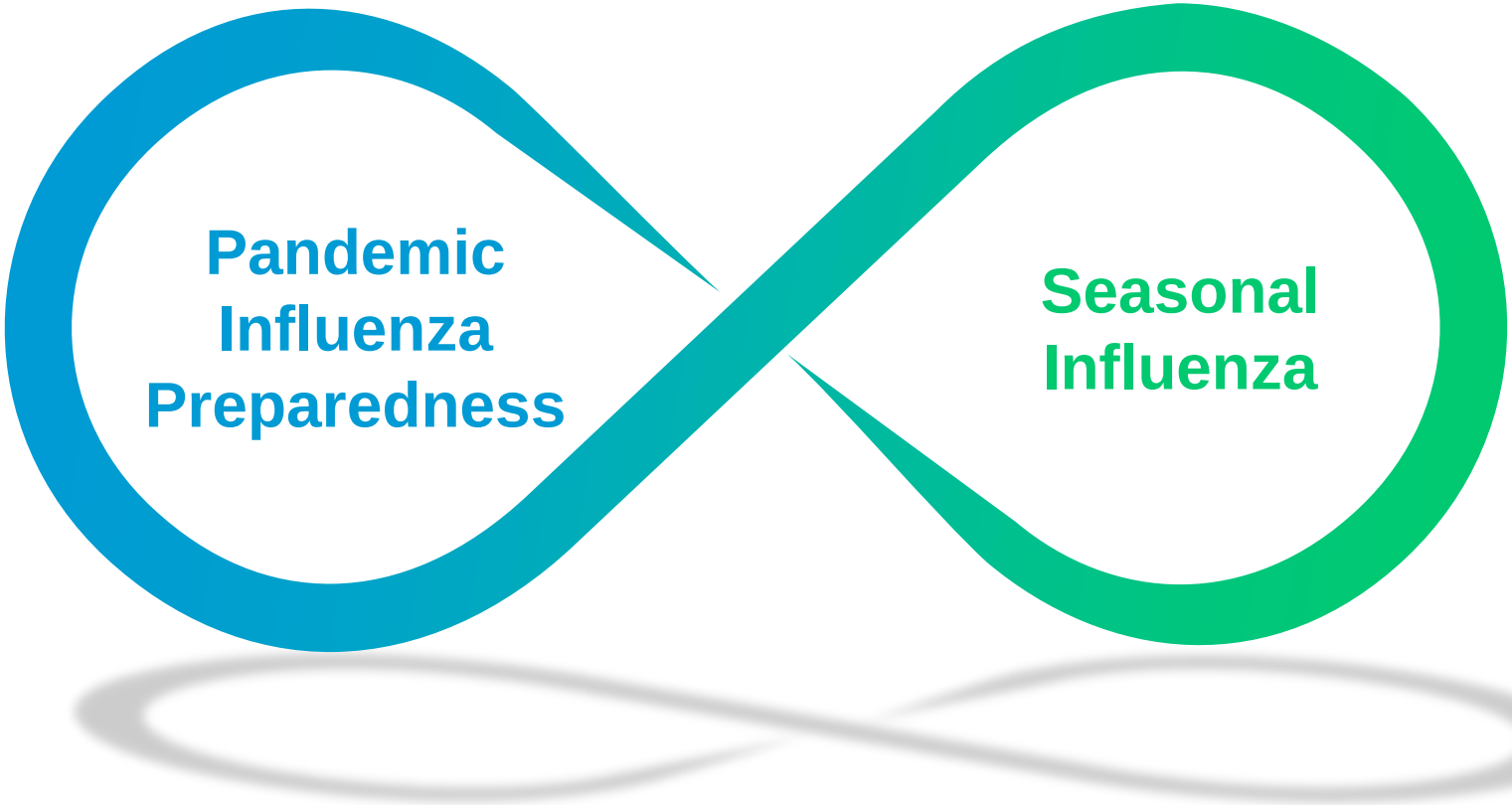
Ruben Donis, PhD
Deputy Director, Division of Influenza and Emerging Infectious Diseases
BARDA/ASPR/HHS

National Influenza Vaccine Modernization Strategy (NIVMS)-Listening Session

Influenza Vaccine Modernization



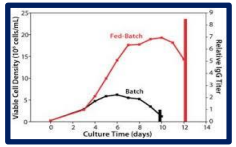
1. Strengthen and diversify influenza vaccine development, manufacturing, and supply chain;
2. Promote innovative approaches and use of new technologies to detect, prevent, and respond to influenza; and
3. Increase influenza vaccine access and coverage across all populations.


Pandemic
Influenza
Preparedness
Seasonal
Influenza

Improving Influenza Vaccine Preparedness/Response

More Vaccine Production

Antigen & Adjuvant Production



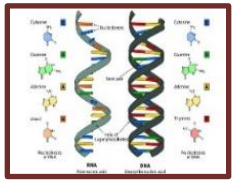
Antigen Yield

Filling Capacity

emergent BioSolutions

CIADM

Faster Vaccine Production



Faster Manufacturing Platforms

Faster Testing and Release

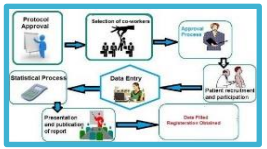
Improve Vaccine Delivery

Alternative Routes of Administration

Single dose vaccine

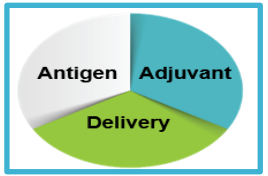
Address Needle/Syringe Supply Gap

Improved Access and Effectiveness



Adjuvant Testing

Expand licensed age range

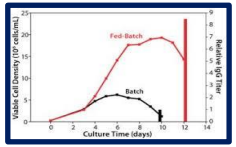


Improved efficacy

Improving Influenza Vaccine Preparedness/Response

More Vaccine Production

Antigen & Adjuvant Production

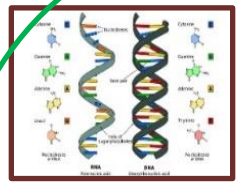


Antigen Yield

Filling Capacity

CIADM

Faster Vaccine Production



Faster Manufacturing Platforms

Faster Testing and Release

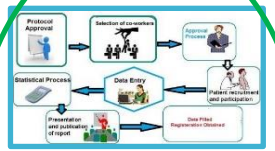
Improve Vaccine Delivery

Needle-free delivery

Single dose vaccine

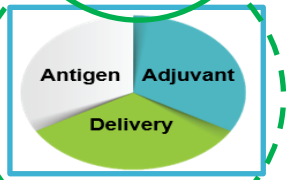
Address Needle/Syringe Supply Gap

Improved Access and Effectiveness



Adjuvant Testing

Expand licensed age range

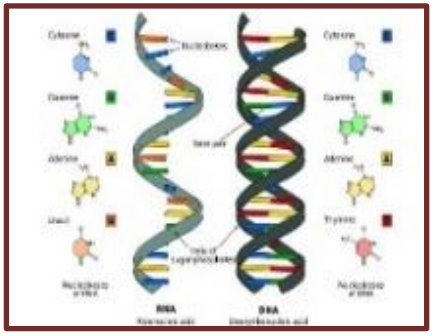


Improved efficacy?

Innovative Approaches and New Technologies

Faster Vaccine Production

Faster Manufacturing Platforms



- Recombinant antigen
- ‘Genetic’ vaccines
  - Nucleic acid
  - Vectors

Faster Testing and Release Implementation

- Potency assay
- Sterility assay
- Adventitious agents

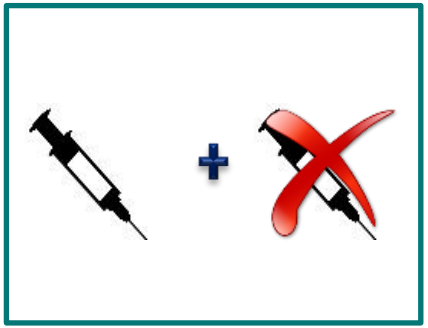
Innovative Approaches and New Technologies

Improved Access and Efficacy

Alternative Routes of Administration

- Micro Array Patches
  - Coated
  - Dissolving
- Oral Vaccines
  - Delivery Vectors

Single Dose Vaccines

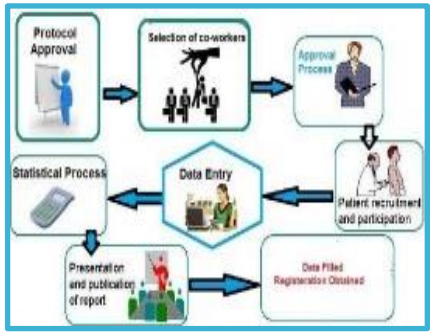


- Alternative Routes
- Vectors
- Adjuvants

Innovative Approaches and New Technologies

Improved Access and Efficacy

Adjuvant Development

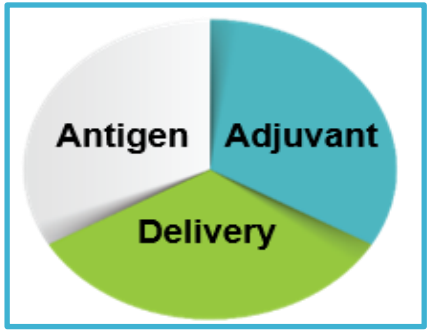


- Novel properties
- Safety
- Cost
- Sustainability

All populations

- > 6 months
- High risk

Better Vaccines



- Cross-protective
- Durable

BARDA Partnership Pathway

Pre-clinical data for pre-pandemic benefit

Production feasibility and non-clinical/clinical safety data

'End to end' manufacturing plans (and/or partners)

Proposal and award

Complete pre-clinical and formulation development

Clinical feasibility

Advanced development opportunity

Vaccine Collaborations/Partnerships

Thank You


BIOMEDICAL ADVANCED RESEARCH AND DEVELOPMENT AUTHORITY
BARDA

JPEO-CBRND

Preventing the Worst by Providing the Best

ENABLING BIOTECHNOLOGIES INFLUENZA RESPONSE

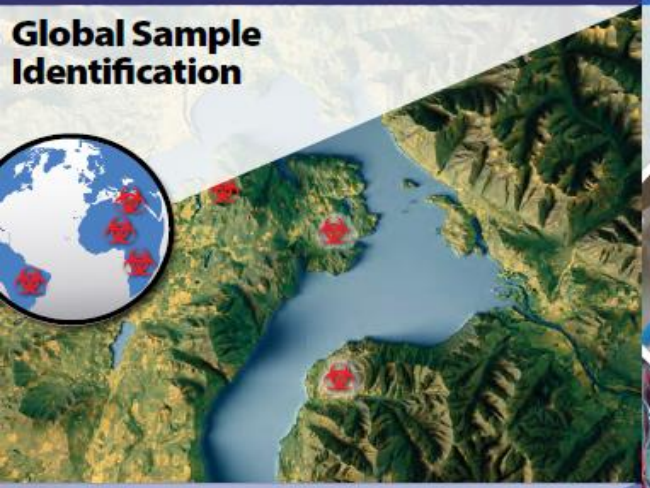
October 6, 2020

Bruce Goodwin

JPL CBRND Enabling Biotechnologies

Enabling Biotechnologies: From Information to Injection

Characterize Threat



Select Technology

Manufacture Product

Test and Distribute

Medical Solutions During a Crisis for Future Threats

ENABLING BIOTECHNOLOGIES MISSION SPACE

OUTBREAK

CHARACTERIZE THREAT

What is the threat?

- Gather sequence data for analysis
- Determine engineered vs known
- Epidemiologic projection

Are there existing countermeasures?

- Use licensed MCM, if available
- Advance non-licensed MCM, if available

SELECT TECHNOLOGY

What is the most optimal outbreak countermeasure?

- Match to the outbreak requirements
- Prioritize prophylactic vs treatment

How rapidly can it be developed?

- Leverage advanced tools to accelerate development
- Balance product development timeline with outbreak urgency

MANUFACTURE PRODUCT

Is there capacity to meet outbreak requirements?

- Clear additional suites at DoD-ADM
- Leverage BARDA ADMs

How rapidly can it be manufactured?

- Utilize the most optimal production technology
- Produce and rapidly deliver doses

TEST & DISTRIBUTE

What is the fastest efficacy/safety product assessment?

- Utilize state-of-the-art testing technologies
- Work with the FDA to accelerate time to injection
- Conduct field clinical trials

How rapidly product can be delivered?

- Tailor distribution to the dynamics of outbreak

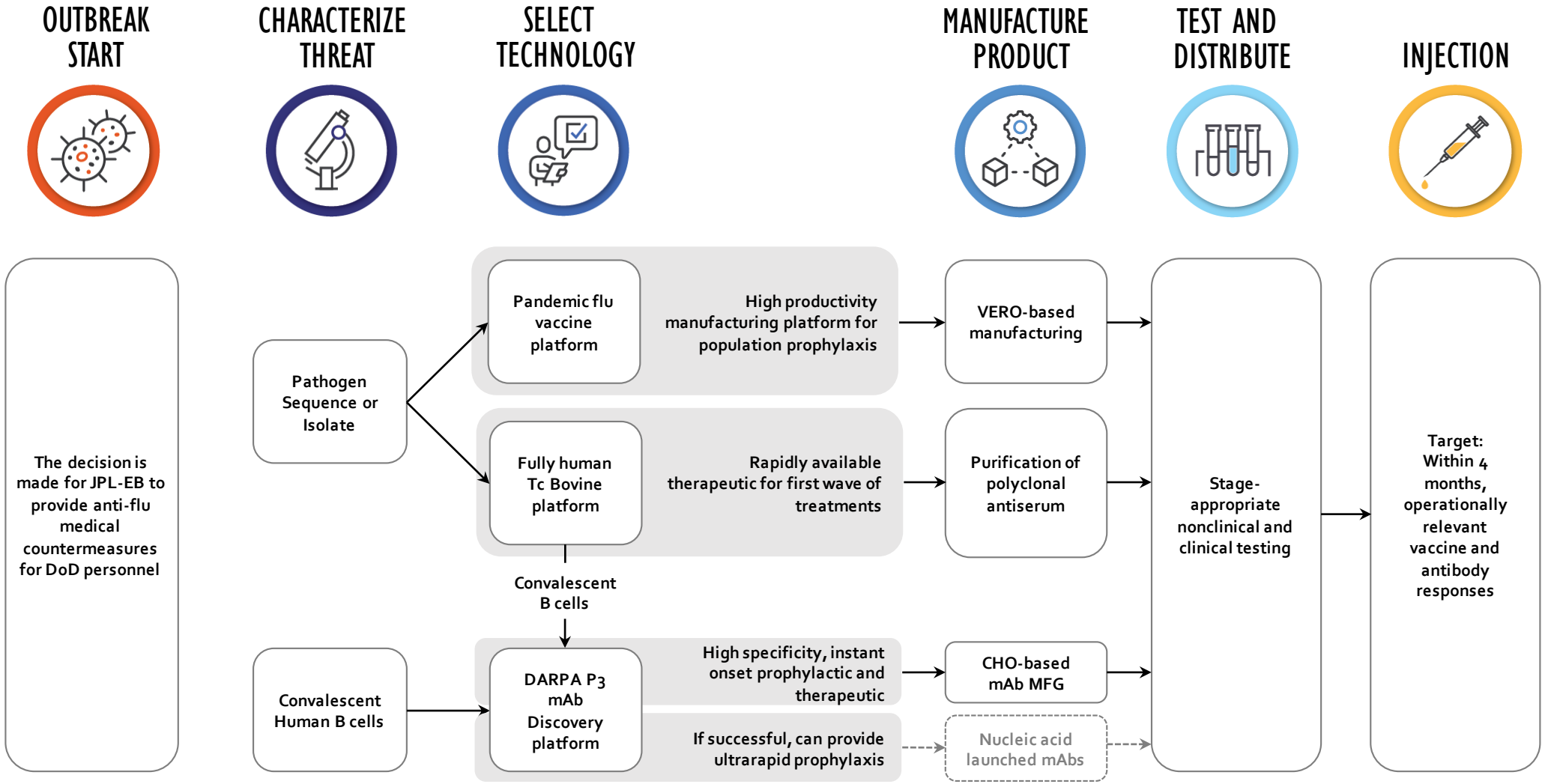
INJECTION

FROM INFORMATION TO INJECTION

ENABLING BIOTECHNOLOGIES INFLUENZA RESPONSE STRATEGY

- Provide a combination of prophylactic and therapeutic countermeasures for complete outbreak coverage for the Warfighter
  - Instant onset, short-term antibody therapeutics
  - Delayed onset, long-term pandemic strain vaccines
- Use priority access to the DoD-ADM for rapid outbreak response
- Leverage existing vaccine and monoclonal antibody production platforms at DoD-ADM
- Partner with DARPA to:
  - Leverage rapid Pandemic Preparedness Program (P3) antibody discovery methodology
  - Prepare for potential transition of P3 ultrarapid nucleic acid launched countermeasures
- Engage state-of-the-art testing methodologies to accelerate efficacy and safety assessment
- Ensure that response capabilities can be leveraged beyond influenza pathogens

ENABLING BIOTECHNOLOGIES INFLUENZA RESPONSE



FROM INFORMATION TO INJECTION

INFLUENZA VACCINE – DOD-ADM

Executive Order Section 4(b)(vi) – direct the conduct of a study to assess the feasibility of using DOD's advanced manufacturing facility for manufacturing cell-based or recombinant influenza vaccines during a pandemic

- DoD-ADM (Ology Bioservices) holds a license to produce inactivated viral vaccines
  - Vero-cell based process originally developed by Baxter
  - Previously approved for use in several countries
- DoD-ADM facility can accommodate pandemic influenza vaccine manufacturing
  - Scales consistent with DoD requirements (millions of doses) are feasible
  - Manufacturing process adaptation to high-yield technologies will be needed
- Full capability readiness will require pre-pandemic FDA licensure of an influenza vaccine
  - Ensures FDA familiarity with product, manufacturing process, release assays, etc.
  - Will require collaborative agreements between DoD medical development offices
- Appropriate funding sources will need to be identified for standup, maintenance, and response activities

INFLUENZA VACCINE – DOD-ADM

Clinical experience and vaccine approvals using Vero production technology

Summary of Clinical Experience using Vero technology for Viral Vaccines

Product	Development Phase	# Clinical Subjects	Dosage
Seasonal Influenza (Preflucel®)	US BLA filed Licensed EU	10,800	15 µg/strain (45 µg total)
Pandemic H1N1 (Celvapan®)	Licensed EU, Australia, Brazil, New Zealand	5,000	7.5 µg adults 3.75 µg pediatric
Pandemic H5N1 (Vepacel®)	Licensed EU, Australia, Switzerland, New Zealand	4310 Adult 300 Pediatric	7.5 µg adults 3.75 µg pediatric
Pandemic H9N2	Phase 2	275	3.75-45 µg adult
Ross River Virus (RRV)	Phase 3 Australia	2,400	2.5 µg adult (with adjuvant)
West Nile	Phase 1/2	320	5-10 µg adult (with adjuvant)

Vero cell technology-produced vaccine marketing approvals

Generic Name	Trade Names	Territory
Influenza vaccine – split virion inactivated	Preflucel	Austria
		Czech Republic
Pre-pandemic influenza vaccine H5N1 (strain A/VIETNAM/1203/2004)	Vepacel	EU
		New Zealand
		Hong Kong
Pandemic influenza vaccine H5N1	Pandemic Influenza Vaccine H5N1 Baxter	EU
		Australia
		New Zealand
		Hong Kong
		Singapore

INFLUENZA ANTIBODIES

Section 4(b)(vii) – accelerate, in collaboration with HHS, research regarding rapidly scalable prophylactic influenza antibody approaches to complement a universal vaccine initiative and address gaps in current vaccine coverage.

- A collaborative approach will be needed to address rapidly scalable antibody approaches
  - JPL-Enabling Biotechnologies (JPL-EB) – rapid response approach/technologies
  - DARPA Biological Technologies office (DARPA-BTO) – Pandemic Prevention Program (P-3)
  - Interagency partners – NIH animal models/screening technologies, JPM-Medial diagnostics, etc.
  - BioMap DoD/HHS interagency ADM working group
- Layered defense approach includes polyclonal and monoclonal antibodies
  - Fully human polyclonal antibody product provides rapid protection/treatment for pandemic influenza
  - Discovery of targeted monoclonal antibodies using DARPA-BTO programs feed into
    - CHO cell-based antibody production (JPL-EB) – industry standard approach
    - Highly innovative, ultra rapid nucleic acid-launched delivery technologies (DARPA-BTO).
- Appropriate funding sources will need to be identified for standup, maintenance, and response activities
  - Some standup efforts currently funded by JPL-EB and DARPA-BTO

CHEMICAL AND BIOLOGICAL INCIDENT PREPAREDNESS AND RESPONSE FUNDING

- CBIPR 'passback' funds are being used to improve responsiveness of the DoD-ADM across product lines:
  - Pre-defining levels of response urgency to ensure maximum efficiency during an event
  - Standardizing cGMP processes, batch records, documentation to the maximum extent
  - Tailoring quality systems to enable support of rapid response activities
  - Analyzing materials flows, including all supply chains (long lead items, foreign dependencies) to ensure availability and efficiency of material release for manufacturing
  - Building computational tools to increase product manufacturability, reduce the need for process development, and decrease the product attrition rate
  - Optimize production campaign yields, and decrease production times by using high-yield and/or continuous manufacturing processes
  - Minimizing drug product release times, including real-time release methods

CONTACT

Bruce Goodwin

Joint Product Lead (Acting), Enabling Biotechnologies
Joint Program Executive Office, CBRN Defense

Bruce.g.goodwin4.civ@mail.mil
www.jpeocbrnd.osd.mil

Public Affairs Office
Phone: 410-436-9000

Contracting
Alan Burket | 443-655-8608
Jeff Megargel | 410-417-2323

Online
jpeocbrnd.osd.mil

@JPEOCBRND