Building Pandemic Preparedness Through a Sustainable Enterprise for Influenza Vaccines

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Building Pandemic Preparedness Through a Sustainable Enterprise for Influenza Vaccines

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Albufeira, Portugal
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BARDA’s mission is to support development and availability of countermeasures for CBRN threats, pandemic influenza, and emerging infectious diseases through advanced product development, stockpile acquisition/building, manufacturing infrastructure building, and product innovation.
Influenza Vaccine Goals

- Establish and maintain a dynamic vaccine stockpile against influenza strains with pandemic potential available for up to 20 M persons

- Provide pandemic vaccine to all U.S. citizens within 6 months of a pandemic declaration (600 M doses)

National Strategy for Pandemic Influenza (Nov 2005) and HHS Pandemic Influenza Plan (Nov 2005) www.pandemicflu.gov
Pre-2003 Pandemic Influenza Vaccine Goal & Strategy

Egg-based Vaccines

22-24 weeks

Demand for Healthcare Services

## Influenza Vaccine Portfolio

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MORE
Build on Existing Egg-based Technology
In the beginning........

...at BARDA, the egg came first!

Egg-based Technology Investments

• The most attainable goal for near term pandemic preparedness
    • Established a year round supply of fertilized eggs for influenza vaccine manufacturing
    • Created inventories of other essential supplies (vials, preservative, etc.)
    • Contracts to produce vaccine for pre-pandemic stockpile and in the event of a pandemic (2009)
    • Manufacturing base gains experience producing pandemic virus vaccine at commercial scale
  — Facility Retrofit Contracts (2007)
    • Expanded domestic facilities for inactivated and live-attenuated influenza vaccine production
BETTER
Newer Influenza Vaccine Technology
Cell-based Influenza Vaccines

• Provide more robust, flexible, and scalable process for manufacturing influenza vaccines

• Awarded 6 contracts in 2005-06 for advanced development of US licensed cell-based seasonal & pandemic influenza vaccines with commitment for domestic surge capacity of 150M doses within 6 mos. of pandemic onset

• Novartis, Baxter, sanofi pasteur, GSK, Solvay, MedImmune
  — One manufacturer filed their BLA in October 2012
  — One completed pivotal Phase 3 clinical studies & expected to submit a BLA in 2012-13
  — One manufacturer in early stage development
  — Three programs are no longer active
Antigen-sparing Adjuvant Technologies

- Adjuvants, immunostimulating molecules, provide dose-sparing effects, cross-strain protection (in animal models) and reactivity in serological assays, and enhanced immune responses to vaccines.

- ASPR/BARDA awarded 3 contracts in 2007 ($133 M) for advanced development of US-licensed pandemic influenza vaccines with adjuvants:
  - Novartis, GSK, Intercell (formerly IOMAI)
  - One manufacturer (GSK) has completed Phase 3 clinical studies & submitted a BLA in February 2012
  - One manufacturer has completed Phase 2 clinical studies
  - One contract is no longer active

- Mix-n-Match program with NIH:
  - H1N1 program with sanofi pasteur antigen and GSK adjuvant completed
  - H5N1 program with sanofi pasteur antigen and GSK & Novartis adjuvants
    - IND filed December 2010 and clinical testing started Q2 2011
Public Private Partnership Changed U.S. Vaccine Industry

First cell-based influenza vaccine mfg. facility in the U.S. (Novartis):
Dedicated as Pandemic Ready in December 2011

FASTER
Technology Innovation for Influenza Vaccines
Recombinant & Molecular Vaccine Technologies

• Recombinant & molecular technologies may provide vaccine sooner with less dependence on influenza virus strain properties

• BARDA awarded contracts in 2009 & 2011 for advanced development of US-licensed recombinant-based seasonal & pandemic influenza vaccines with commitment for domestic manufacturing surge capacity of 50 M doses in 6 months of pandemic onset & initial lot release in 12 weeks

• Protein Sciences, Novavax, & VaxInnate
  – One manufacturer completed Phase 3 clinical trials & BLA submitted
  – Two manufacturers in Phase 2 clinical studies
• Build or Retrofit Manufacturing Facilities
  — Newly constructed or retrofitted existing facilities in the U.S. will utilize state-of-the-art flexible manufacturing approaches for platform vaccine and biopharmaceutical product technologies

• Provide ADM Core Services for CBRN\ID MCMs
  — Upstream & downstream process development, optimization, scale up, and validation
  — Manufacturing process validation
  — Product formulation chemistry
  — Lot release & clinical testing assay development, optimization, and validation
  — Quality systems (Control & Assurance – GMP & GLP compliance)
  — Regulatory affairs (IND, EUA, BLA, NDA submissions & strategy)
  — Clinical investigational lot manufacturing (pilot scale)
  — Commercial scale manufacturing
  — Program management

• Workforce Development Training Program

• Provide Emergency Flexible Vaccine Manufacturing for Pan Flu & Other Threats
  — Pandemic influenza vaccine manufacturing capacity should be at least 50 million doses

BARDA Core Services

Centers for Innovation in Advanced Development & Manufacturing

Technical Expertise

Animal Studies Network

Modeling Expertise

Fill/Finish Mfg Network

Strategic Investor

Regulatory & Clinical Affairs

Selected PCAST and MCER Recommendations

• Interagency Initiatives: (BARDA, CDC, FDA, NIH) + Industry

  — Establish HHS interagency program with industry to optimize influenza virus vaccine strains for production yield

  — Develop faster potency & sterility assays
BARDA has used a staged approach to build a sustainable influenza vaccine enterprise for pandemic preparedness by investing in technologies that produce:

MORE vaccine
BETTER vaccine
FASTER vaccine
“Hot off the press” or “This just tweeted” in 2012

• Quadrivalent Seasonal Influenza Vaccines
  – 29 Feb 2012: MedImmune FluMist Quadrivalent influenza vaccine licensed by the FDA for active immunization of individuals 2 through 49 years of age (http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm294057.htm)

• Pre-pandemic Vaccines
  – 02 Mar 2012: Baxter receives marketing authorization in EU for Vepacel pre-pandemic influenza vaccine – first approved Vero cell vaccine
  – 05 Mar 2012: GSK submitted US and EU regulatory applications for a H5N1 influenza vaccine (http://www.gsk.com/media/pressreleases/2012/2012-pressrelease-963574.htm)

• Universal Influenza Vaccines
  – 31 Jan 2012: Inovio shows cross-strain immune responses in animals generated by SynCon® consensus sequence DNA vaccine
  – 23 Feb 2012: Biondvax Phase IIa with elderly volunteers. Created immune response alone and improved immune response when used as a booster.
Thank You for Your Attention

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