Accelerating Vaccine Development for Epidemic Preparedness: New Vaccines for a Safer World

Richard Hatchett, MD
CEO, CEPI
CEPI’s Gestation (1)

February 2016 to June 2016, three expert Task Teams convened:

1. Challenges and potential solutions for pathogen prioritization, R&D/ CMC capacity and regulatory pathways

2. Relevant partnership models

3. Promising funding strategies
CEPI’s Gestation (2)

Task Teams made *select* recommendations:

- **Make vaccine R&D investments on advanced development phases** - from late preclinical to proof of concept in humans (phase II trials)

- Support **technical and institutional platforms** that can be used for rapid vaccine development against known and unknown pathogens in the event of a new epidemic

- Develop policies on principles of **equitable access, cost coverage, risk-benefit sharing, and IP management**

- Explore risk sharing arrangements such as **milestone payments**
CEPI Launched at Davos

19 January 2017
What is CEPI?

- CEPI is a partnership of public, private, philanthropic and civil society organisations
- CEPI will stimulate, finance and coordinate vaccine development
  - Against priority threats, particularly when market forces fail to drive needed development
  - By supporting the development of rapid response vaccine development and manufacturing platforms

How will CEPI work?

- CEPI will move vaccine candidates through late preclinical studies to proof of concept and safety in humans before epidemics begin
  - Effectiveness trials can begin swiftly in an outbreak
  - Stockpiles are ready for potential emergency use
- CEPI will build technical platforms and institutional capacities that can be rapidly deployed against new and unknown pathogens

New vaccines for a safer world
http://cepi.net/
Strategic objectives

1. **Preparedness**
   Advance late-stage EID vaccine development to enable testing in the initial stages of an outbreak

2. **Response speed**
   Build technical and institutional platforms to accelerate research, development, manufacturing, and clinical evaluation in an outbreak

3. **Market predictability**
   Secure industry participation through partnerships that share the risks and benefits of vaccine development

4. **Equity**
   Support the long-term development of regional capabilities for EID vaccine preparedness
CEPI fills a critical gap and depends on long-term partnerships

**Current Stakeholders**

<table>
<thead>
<tr>
<th>Phase</th>
<th>1 Discovery</th>
<th>2 Development/Licensure</th>
<th>3 Manufacturing</th>
<th>4 Delivery/Stockpiling</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Academia</td>
<td>Industry</td>
<td>Industry</td>
<td>GAVI</td>
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<td>Governments</td>
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<td>BARDA</td>
<td>UNICEF</td>
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<td>WT/NIH</td>
<td>Regulators</td>
<td>CMOs</td>
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<td>EC/IMI</td>
<td>Governments</td>
<td>WHO</td>
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<td>Bill and Melinda Gates</td>
<td>WHO</td>
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<td>Biotech</td>
<td>Foundation</td>
<td>GHIF</td>
<td>Industry</td>
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**Significant focus by others**

- CEPI role as a facilitator
- CEPI role as a funder
- Significant focus by others
What we’re doing

Calls for Proposals
1: Lassa, Nipah, MERS
2: Platform technologies

Working groups

Partnerships/meetings

Resource mobilization

Setting up the organization
### WHO priority pathogens and CfP1

#### Pathogens chosen for vaccine development by the CEPI SAC, November 2016

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>No. of votes</th>
<th>Percent of members voting for this pathogen</th>
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<tbody>
<tr>
<td>MERS</td>
<td>20</td>
<td>100%</td>
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<td>15</td>
<td>75%</td>
</tr>
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<td>Nipah</td>
<td>11</td>
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<tr>
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</tr>
<tr>
<td>Rift Valley</td>
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<td>25%</td>
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<tr>
<td><strong>Total votes</strong></td>
<td><strong>60</strong></td>
<td>(3 votes, 20 people)</td>
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#### Diseases to be urgently addressed under the R&D blueprint, as of May 2016

- Crimean-congo Hermorrhagic fever virus
- Filovirus diseases (i.e. EVD & Marburg)
- Highly pathogenic emerging coronaviruses relevant to humans (MERS CoV & SARS)
- Lassa fever virus
- Nipah virus
- Rift Valley fever virus
- Novel Agent (a new severe infectious disease)
- Chikungunya virus
- Severe fever with thrombocytopenia syndrome
- Congenital abnormalities and other neurological complications associated with Zika virus

#### Serious diseases necessitating further action as soon as possible, as of May 2016

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Lassa fever

Disease burden
- Endemic, annual outbreaks
- Estimated 300,000 cases/year
- 80% asymptomatic;
- ~30% CFR among symptomatic

Key countries
- Sierra Leone
- Liberia
- Ivory coast
- Nigeria

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4501400/
MERS

Disease burden
• Total 2,040 cases
• Endemic cases, outbreaks
• Transmission via camels and human-to-human infections in health care
• ~35% CFR among those diagnosed

Key countries
• Middle East; especially Saudia Arabia (80% cases)
• At risk: Jordan, UAE, Egypt, Somalia, Ethiopia, Sudan
Nipah

**Disease burden**
- Annual outbreaks in Bangladesh/India
- Up to 80% CFR
- Human-human transmission and via intermediate hosts (pigs)

**Key countries**
- Bangladesh
- India
- Malaysia
Disease specific considerations

Lassa
WHO TPP
• Preventive use
• (Reactive use)

Protective immunity profile needed
• Both humoral and cellular immune responses against G protein contribute to protection against disease
• Cellular immunity is likely critical to provide protection

MERS-CoV
WHO TPP
• Preventive use
• Reactive use

Protective immunity profile needed
• Neutralizing antibodies against Spike protein given prophylactically were protective in animal models.
• Cellular immunity may contribute to protection.

Nipah
WHO TPP
• Reactive use

Protective immunity profile needed
• Neutralizing antibodies against the Nipah G protein correlate with protection
Next steps following Board approval

Technical due diligence team
- Technical/Scientific
- Cost challenge, management
- Intellectual Property
- Appendices to agreement

Financial due diligence team
- Financial systems
- Capability to manage funds

Partnership negotiations team
- Partnership agreement draft
- Appendices to agreement
- Strategy for negotiations

Project Scope document
- Partnership agreement

Project Plan document
- Budget
- Milestones

Drafting of legal framework ongoing since June 2017
Partnership agreement draft ready Sept 2017
CfP-2: “Just in Time” vaccines

1. Target a 16-week timeframe from identification of antigen to product release for clinical trials

2. Target a 6-week timeframe from administration of first dose to achievement of clinical benefit (i.e. immune response likely to result in clinical benefit)

3. Produce 100,000 vaccine doses within 8 weeks to impact an emerging outbreak (i.e. from Go-decision to scale-up to production, fill, finish, and release)

Deadline for submission of preliminary proposals:
4 p.m. CEST 17 October 2017
Working groups and other activities

• Working groups
   Stockpiling and procurement
   Regulatory
   Biological Standards, Assays & Animal Models

• Regulatory Science – Ebola
   22 March 2017 meeting at USNAM

• Chikungunya
   February 2018 – India

• Partnerships/relationships
   WHO
   FIND
   PATH
   World Bank
   AU/AVAREF/Africa CDC

• Rapid response
Building the organization
One organization with global reach

Offices have distinct roles and responsibilities

1. Time divided between UK and Norway offices
Resource mobilization

Note: Exchange rates NOK / USD: 8.44; EUR / USD 0.89; CAD / USD: 1.34; AUD / USD 1.32;
Source: World Bank; CEPI donation data; BCG analysis
Summary

• CEPI is a new PDP focused on developing vaccines and rapid response platforms as an insurance policy against epidemics

• CEPI represents a broad coalition of partners including sovereign and philanthropic investors, industry, and representatives of civil society

• CEPI’s goals are to enhance preparedness, accelerate response, ensure market predictability, and promote equity of access

• CEPI seeks new members of the coalition and is actively recruiting professional staff
Thank you!
CfP process and Board engagement

16 July – 3 Aug
Independent expert review of proposals

4 – 15 Aug
CEPI Secretariat - Analysis of independent expert review

23 Aug
SAC meeting for Step 2 CfP review

25 Aug – 12 Sept
Secretariat develops and drafts Recommendations for the Board

21 Sept
Board Meeting

Sept 2017
Awardees notified BD team begins negotiations
Risk management strategy

Risk identification

- **Regulatory**
  - Lack of regulatory approval of cell line for manufacturing

- **Science**
  - Preclinical candidate not mature

- **Clinical**
  - Candidate weakly immunogenic

- **CMC**
  - Process scale up or CMO transfer not feasible

- **Partner Management**
  - Complex consortium

- **Product Strategy**
  - Limited experience in licensing

- **Delivery**
  - Delivery device not ready for use

- **IP**
  - Freedom to operate limited by IP holders

Risk mitigation

- Ensure that applicants develop detailed, integrated product development plans
- Stage gating assessments for go/no-go decisions
- Implement a robust portfolio management system
- Implement operating protocols and processes for go/no-go decisions on lead and back-up vaccine candidates
# Expertise in due diligence teams

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<thead>
<tr>
<th>Expertise</th>
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<tbody>
<tr>
<td>Project management</td>
</tr>
<tr>
<td>Science &amp; disease specific</td>
</tr>
<tr>
<td>CMC, process, QC</td>
</tr>
<tr>
<td>Pre-clinical, immune</td>
</tr>
<tr>
<td>Preclinical, safety &amp; toxicology</td>
</tr>
<tr>
<td>Clinical trials</td>
</tr>
<tr>
<td>Management</td>
</tr>
<tr>
<td>RA and QA</td>
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<tr>
<td>Cost challenge</td>
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Refocusing the Joint Coordination Group

10-15 long-term members whose interests cut across the portfolio:
- Multilateral institutions (e.g., WHO)
- Regulatory agencies (e.g., EMA)
- Procurement agencies (e.g., UNICEF, Gavi)
- Responders (e.g., MSF)

Time-bound vaccine-specific members:
- National regulatory agencies
- National institutes of public health
- National research agencies
- +++

Revised scope and function suggests more active engagement of JCG members