How Culture Collections can Assist Responses to Emerging Diseases

Karen Buttigieg

IMED, Vienna, 12th November 2018
### The importance of isolating pathogens

<table>
<thead>
<tr>
<th>Diagnosis typically by molecular methods</th>
<th>Pathogen isolation is needed to:</th>
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<tbody>
<tr>
<td>(RT)-PCR &amp; sequence analysis:</td>
<td>• Validate molecular tests</td>
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<tr>
<td>Relatively fast</td>
<td>• Identify genome sequences</td>
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<tr>
<td>Inexpensive</td>
<td>• Generate antibodies</td>
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<tr>
<td>Reduced biocontainment</td>
<td>• Develop therapeutics</td>
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<td>Serology:</td>
<td>• Challenge pre-clinical vaccines</td>
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<tr>
<td>Can detect longer window than viraemia / bacteraemia</td>
<td>• Conduct basic research into pathogenesis, transmission, vector competence</td>
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<td>Can miss unexpected causes</td>
<td>• Increase preparedness for future emergence</td>
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The administrative burden of sharing

- Emergency preparedness requires many participants, not just the isolating laboratory
- Sharing biological resources often required by publishers & funders

- Export licenses for sender
- Import licenses for receiver
- Dual-use regulations & permits
- Environmental regulations for animal & plant pathogens
- Intellectual Property rights
- Terms & Conditions of use / onward transfer
- Potential drift / loss of characteristics / contamination → reputation
- Dangerous Goods shipping regulations & Declarations
- Packaging requirements for IATA compliance
Delegate sharing to a Culture Collection

- Diagnostic validation
- Therapeutic testing
- Basic research
- Vaccine development

- Logistics and dispatch systems well established
- Intellectual Property rights retained by Depositor
- Quality management systems in place to authenticate every batch
This helps recipient researchers too
Best to deposit *before* an outbreak

- Much preliminary administration already in place before high-throughput dispatch required
- Cryopreserved, authenticated product already prepared ready for dispatch

*Zika virus strain MP1751* held at Porton Down since 1962. Deposited in NCPV in 2013.

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<tbody>
<tr>
<td>Patients test positive for Zika virus in Brazil</td>
<td>Reported on ProMed</td>
<td>NCPV start banking Zika virus deposit</td>
<td>1st request received</td>
<td>Available from NCPV (only!)</td>
<td>PHEIC</td>
<td>1st bank exhausted. 2 new banks grown &amp; available</td>
<td></td>
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Prioritisation of pathogens

World Health Organisation Blueprint priority diseases:

- Zika
- Rift Valley fever
- MERS-CoV / SARS
- Nipah
- CCHF
- Ebola virus / Marburg virus
- Lassa fever
- Disease X

Johns Hopkins Center for Health Security study “The Characteristics of Pandemic Pathogens”:

Respiratory RNA viruses are *most likely* to cause a global pandemic, but don’t ignore other possibilities
1. Live pathogens are needed for preparedness and response to emerging diseases

2. Sharing of biological material is necessary, but requires a lot of administration

3. Depositing strains with a Culture Collection allows faster, more efficient sharing

4. Deposits can be made before, during or after an outbreak

5. Pandemics cannot be accurately predicted, so a broad range of pathogens should be continuously deposited, as part of ongoing surveillance
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