PRROtect
Lessons from COVID-19
Building a unique pandemic Preparedness and Rapid Response TECHNOLOGY Platform
Viral pandemics are a permanent threat

>10 pathogenic viruses have emerged in the last century, many more are being identified
The next pandemic threats are known – the need to act is today

Clear WHO recommendation on which viruses to target – and why

1. **Coronaviruses**
   - 3 strains on WHO priority list of greatest public health risks
   - Strains in bat populations capable of infecting humans

2. **Influenza viruses**
   - 4 strains of high risk to enduce pandemics are under surveillance
   - More agents needed to combat resistance, and pandemic strains

3. **Crimean-Congo-Haemorrhagic Fever (CCHF)**
   - Endemic in Africa, Balcans, Middel-East and Asia
   - No approved treatment

4. **Nipah viruses**
   - Human-to-human and animal-to-human transmission
   - No vaccines or treatments

5. **Lassa viruses**
   - Acute viral haemorrhagic illness
   - Animal-to-human, and human-to-human transmission

6. **Additional Data**
   - 84m infections/year
   - 1.8m deaths/year
   - 3-5m infections/year
   - 290k-650k deaths/year
   - Up to 15k each year
   - Fatality rate up to 30%
   - 18 outbreaks since 1998
   - Fatality rate 40-75%
   - 100k-300k infections/year
   - 5k deaths/year

References:

Four key challenges to developing better therapeutics

Integrated approach including inter-pandemic Preparedness and Rapid Response needed

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Threat</th>
<th>Solutions</th>
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<tbody>
<tr>
<td>#1 Timelines</td>
<td>• Development time for novel therapeutic drugs during pandemic too long</td>
<td>• Pre-develop first-in-class therapeutics to phase II-readiness</td>
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<td>#2 Efficacy</td>
<td>• Repurposed therapeutics show limited impact on survival rates</td>
<td>• Develop therapeutics for pre-selected virus classes and with novel mechanism-of-action</td>
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<td>• Escape variants reduce efficacy of therapeutics</td>
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<td>#3 Product profile</td>
<td>• Approved antibodies have unattractive product profile</td>
<td>• Improve antibody product profile</td>
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<td>• Existing immuno-modulators are insufficient</td>
<td>• Develop novel classes of immuno-modulators</td>
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<td>#4 Availability</td>
<td>• Increased demand for antibody development and production capacity and platforms</td>
<td>• Build flexible, low-cost antibody manufacturing solutions</td>
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Three-pronged approach provides optimised protection
Preparation/Pre-development, Rapid Response and Manufacturing capacity

The three important axes of prevention

**Preparation / Pre-development**
- Development of therapeutics against high-risk viruses\(^1,2\)
- Rapid employment due to pre-development to Phase II-readiness

**Rapid Response**
- Cutting-edge antibody design provides highly effective antibodies
- New technologies shorten time of development of neutralising antibodies from outbreak to six months

**Flexible manufacturing capacity for antibodies, e.g. J.POD®**
- Highly efficient antibody manufacturing
- Three months of manufacturing to protect ~2 m medical professionals against a disease

Pre-development of new therapeutics saves up to 5 years
New mode-of-actions against high-risk virus\(^1\) \(^2\) pursued by Evotec and future partners

Utilise full suite of modalities for early therapy

<table>
<thead>
<tr>
<th>Small molecules and degraders</th>
<th>Neutralising antibodies</th>
<th>New immune-modulators</th>
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<tbody>
<tr>
<td>• Alleviate symptoms</td>
<td>• Broad neutralisation of viruses</td>
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<tr>
<td>• Potentially modify disease</td>
<td>• High-avidity, pan-specific</td>
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<td>• Attractive product profile</td>
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<tr>
<td></td>
<td>• Boost immune response</td>
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<td></td>
<td>• Stop symptoms</td>
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<td>• Reduce virus spread</td>
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<td></td>
<td>• Orally available</td>
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<tr>
<td></td>
<td>• Variant-agnostic</td>
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<td></td>
<td>• Applicable to different viruses</td>
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Tailored programmes for each threat

- Corona viruses
- Influenza viruses
- CCHF viruses
- Nipah viruses
- Lassa viruses

Pre-development of new and effective therapeutics to clinical Phase II-readiness leads to time-saving of up to five years in the next pandemic

\(^1\) https://www.who.int/emergencies/diseases/en/
\(^2\) https://www.who.int/activities/prioritizing-diseases-for-research-and-development-in-emergency-contexts
AI, latest antibody design and efficient manufacturing

Next-generation antibody technologies for efficient Rapid Response actions at grasp

Possible reduction of development time from virus sequencing to clinical Phase I/II down to six months

1 2 3 4 5 6
Outbreak Sequence Antibody development Phase I/II

Combination of AI¹, antibody design and efficient cell culture leads to optimised product profile

New J.POD® manufacturing process allows fast and cost-efficient antibody production

Traditional method

J.POD®

¹ Artificial intelligence
**PRROTTECT will optimise pandemic prevention**

Ambition to have first therapeutics ready for Phase II available as early as 2022

### Preparedness

New therapies showing high efficacy and ready for Phase II to be expected from 2022 onwards

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<th>2022</th>
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<th>2026</th>
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<tr>
<td>Corona</td>
<td>Corona</td>
<td>CCHF Nipah</td>
<td>Lassa</td>
<td>Influenza</td>
<td>CCHF Nipah Lassa</td>
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### Rapid Response & Manufacturing capacities

Expansion of technology - and J.POD® production platforms by 2024 (est.)

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<tr>
<td>Technology Platform</td>
<td>J.POD®</td>
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J.POD® 1 in US opening this year

State-of-the-art manufacturing facility for biologics

- 12,077 square meter production site
- Cost-effective ‘PODular’ production processes that can be reconfigured for flexibility
- PODs already installed
- Certificate of Occupancy in May (employees on site)
- Production from a few kilograms to metric tons in the same facility
- Fully operational in November 2021

Aerial view of new location in Redmond, Washington, US
Europe is the second-largest market for biologicals, local capacities to secure supply are urgently needed

J.POD® 2 EU in Toulouse creates operational efficiency and design for multi-modality biological treatments

Strong support from the French government, the Occitanie region, Bpifrance, the Haute-Garonne prefecture as well as Toulouse Métropole

Two hectares of land at Campus Curie already identified and design plan started

Opportunity to build global J.POD® network to meet future demand for PRROTECTive biologics

**New manufacturing options to avoid drug shortage needed**

Campus Curie home for new J.POD® showcases next-generation options

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1) Dependent of local plannings, environmental and building requirements as well as further conditions