What are the vaccine innovations being considered?

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What do we want to achieve?

Speed

- Rapid discovery & development
- Rapid manufacturing at scale

Accessibility

- Available on demand
- Suitable for global storage, transport
- Affordable to LMICs
- Easily administered

Effectiveness

- Protection against disease
- Transmission blocking
- Broad protection across variants of concern
- Rapid onset of protection
- Long duration of protection

COVID-driven innovation advances

Breakthroughs in speed of R&D…

- Rapid-response platforms: mRNA and adenoviral vectors
  - Standard analytical assays, manufacturing process
  - Regulatory master file
- Process innovations
  - Adaptive clinical trial design
  - Merged clinical trial phases, at-risk staging

… BUT challenges around effectiveness and accessibility

- Long-duration, variant-proof, and transmission-blocking vaccines still beyond reach

- Long delays to global access:
  - Insufficient manufacturing capacity
  - mRNA vaccine distribution limited by high CoGs and ultracold storage

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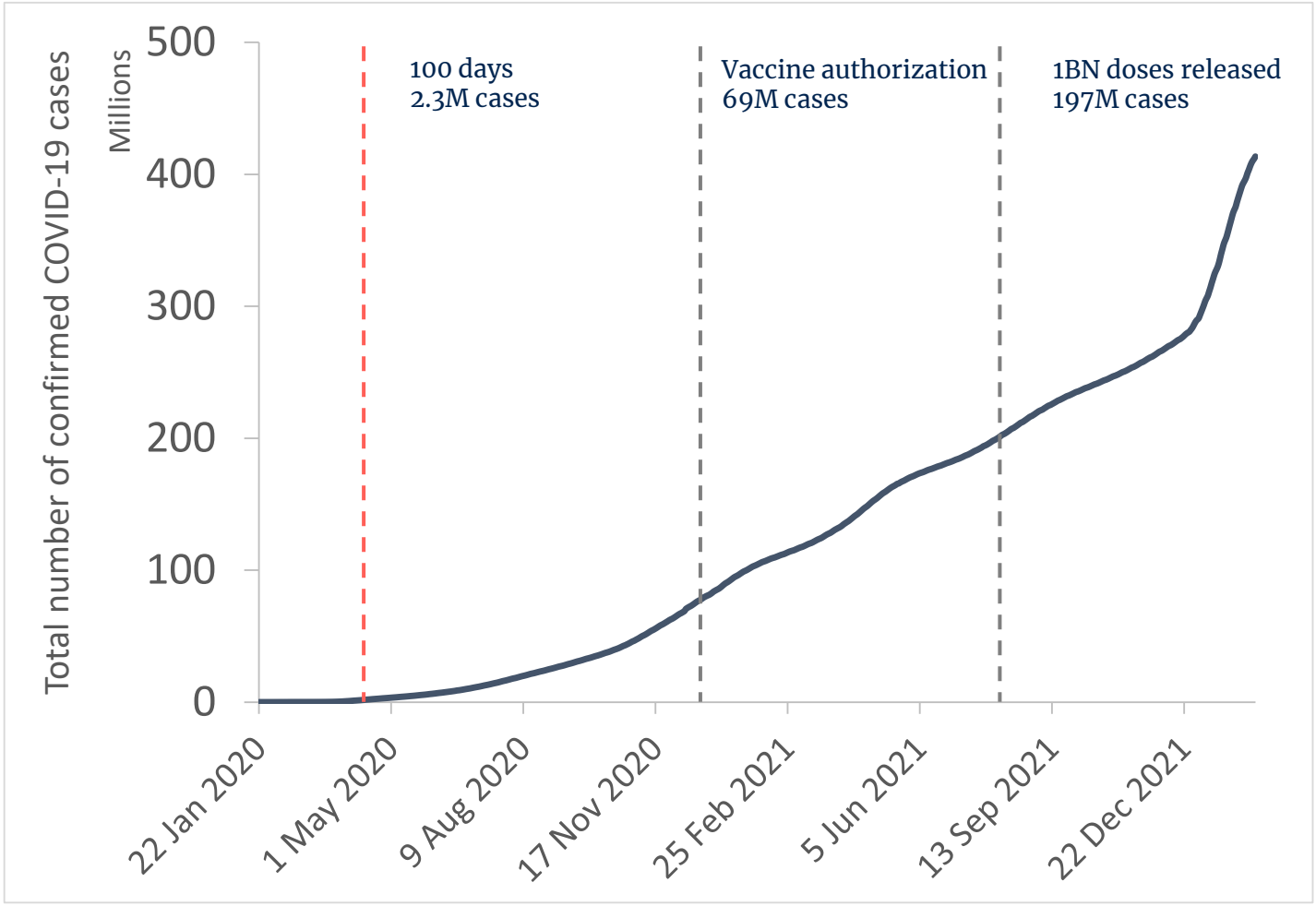
Need for further acceleration



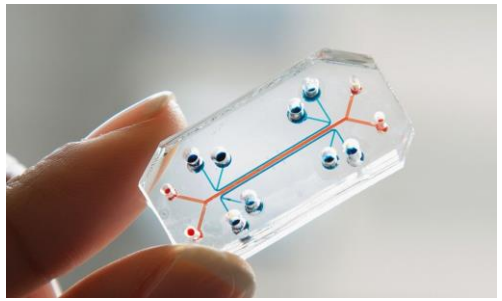
Optimizing current practices can reduce development timeline to ~ 250 days

Innovation is required to achieve the 100-day target

Innovations for speed

Research & Development

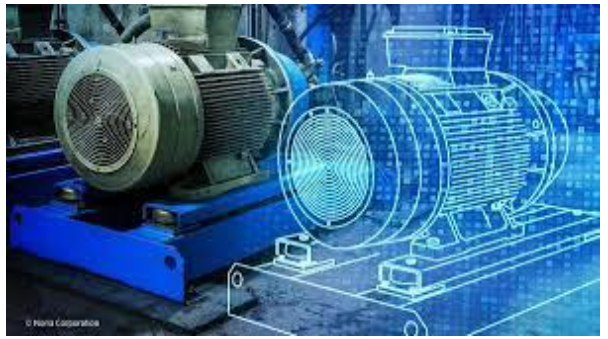
- Computational immunogen design
- *In silico* modeling to guide lead candidate selection and dosing
- Novel assays (organ-on-a-chip?)



Manufacturing

- Digital twins to optimize manufacturing processes
- Synthetic biology approaches for cell-free manufacturing
- Transient transfection at scale for proteins
- Accelerated release testing

How much can protein-based platforms be accelerated?



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Innovations for accessibility

Available on demand

Flexible, modular, scalable manufacturing

Affordable

Low CoGs for manufacturing, raw materials

Adjuvants for dose sparing

Single-dose regimens

Easily stored & transported

Thermostable formulations, stability prediction & monitoring

Easily administered

Needle-free technologies

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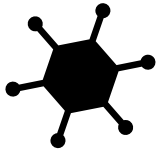
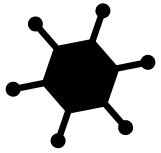
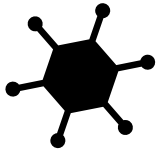
Innovations for improved effectiveness

	Breadth of Protection	Onset of protection	Duration of protection	Transmission blocking
Immunogen design	 AI/machine learning			
Vaccine platforms	 VLPs Adjuvants	 Viral vectors (single dose)	 Protein-based	
Route of Administration				 Mucosal delivery

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