State-of-the-art facilities contribute substantially to human clinical trial efficacy outcomes

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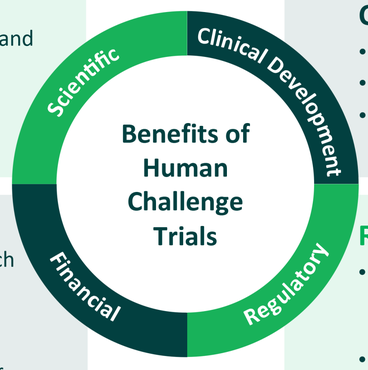
INTRODUCTION

Respiratory pathogens, such as the Influenza virus and Respiratory Syncytial Virus (RSV), remain a significant disease burden globally causing high levels of acute respiratory infections, morbidity and mortality. Human challenge studies have played and continue to play an important role in the development of respiratory virus vaccines and treatments. hVIVO's new facility located in Canary Wharf, London, boasts the largest commercial Phase II human challenge trial facility, which contributes substantially to expediting this development and subsequent approvals of novel vaccines and treatments to meet the ongoing need for interventions for significant respiratory disease burden.

HUMAN CHALLENGE STUDIES

Scientific
- Generates invaluable dosing, safety and efficacy data
- Helps optimise for larger field trials
- De-risks Phase III programs

Clinical Development
- Requires fewer subjects
- Significant time savings
- No seasonal dependence



Financial
- Significant valuation uplift for Biotech sponsor
- Quick, cost-effective data in a tight funding environment
- Allows products to "Succeed fast" or "Fail Fast"

Regulatory
- Potential for Fast Track or Breakthrough designation - accelerating time to market
- Potential approval and Emergency Use Authorisation

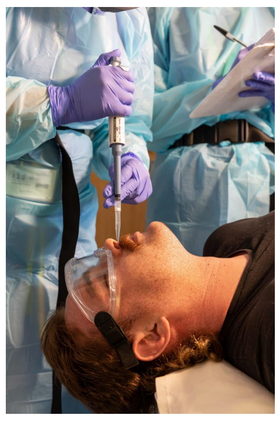


Figure 1: Human challenge studies are typically Phase Ib or Phase IIa clinical trials, in which study participants, *i.e.* healthy volunteers, are deliberately exposed to infectious agents, to better understand the mechanism of infection or disease and test new therapies or vaccines.

Flu Vaccines and Treatments

Field Trial Conceptual Challenges:

Demonstrating efficacy of novel vaccines in the field is time-consuming, costly and associated with risk due to:
- Initial exposure to virus unknown
- Variation in circulating strains
- Large study size and long duration
- Difficult to power for clinical efficacy
- Seasonality limitations
- Complicated Biomarker identification

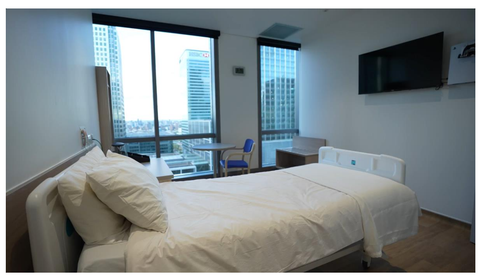
Our Human Challenge Models: Towards a deeper understanding
- Effective exploration of vaccine efficacy & correlates of protection
- Match study design to IMP mechanism of action
- Controlled Immunological investigation
- Host Response Analysis

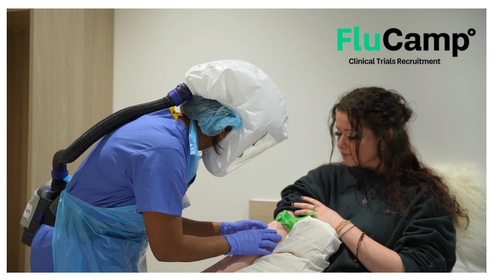
Primary Endpoints:
- Reduction in incidence of symptomatic infection
- Reduction in disease severity

hVIVO's NEW FACILITY

Quarantine Facility

hVIVO's new facility located in Canary Wharf, London boasts the largest commercial Phase II human challenge trial facility:
- **Transmission study capabilities** – with independent room air controls & large communal rooms for infected, in-contact transmission studies allowing for the assessment of new vaccines and their ability to block transmission
- **50-bed quarantine unit over 1 floor** – HEPA filtered, negative pressure, isolation rooms
- **All 50 rooms are able to facilitate** – both hazard group 2 [e.g. Influenza virus, RSV, human rhinovirus] & group 3 pathogens [e.g. SARS-CoV-2, Malaria (*Plasmodium falciparum*) & *Flaviviruses* (Dengue virus, Zika virus)] (**Figure 2**)





- **Volunteer comfort & compliance in quarantine rooms** – highest comfort mattress, air conditioning, freshly prepared meals from on-site chefs & kitchen, amazing views of London, high grade hospital furniture, and entertainment (PS5 consoles & 43" smart TV)
- **Dedicated backup power supply** – uninterrupted power for uninterrupted delivery of our studies, even if all power lines fail
- **Two-way call bell systems** – easy & fast communication between staff and volunteers with a 3-tier alert system to prioritise needs to ensuring both volunteer comfort and medical support
- **Pneumatic chute system** – samples transported to the lab in ~30 seconds

On-site BSL-2 and BSL-3 Laboratories
- **Industry leader in virology clinical trial support** – operates as a highly specialised virology and immunology laboratory
- **Large lab footprint (580m²)** – allows for significant assay throughput & expedited delivery of clinical trial data
- **Highest quality standards** – GCLP, CAP accredited and external QA, HTA, FLUCOP, ensuring the industry standard in clinical trial data
- **Over 80,000 samples per year routinely handled & processed** – all lab analytics for endpoint assays without the need for extensive logistics
- **Analysis of HG3 pathogens** – the BSL-3 lab allows for the analysis of HG3 pathogens including e.g. SARS-CoV-2, Malaria (*Plasmodium falciparum*) & *Flaviviruses* (**Figure 2**)
- **Handling of dangerous pathogen** – the BSL-3 lab structure and access-controls are compliant for Schedule 5 of the United Kingdom Anti-terrorism, Crime and Security Act 2001, allowing for handling of dangerous pathogens
- **Pneumatic chute system** – samples transported from quarantine to the on-site laboratory enables swift sample delivery and processing in ~30 seconds, enabling sample viability for assessment of study efficacy endpoints

Influenza	RSV	HRV	Malaria	Asthma	SARS-CoV-2	hMPV	Flavivirus
H3N2 Perth/09	Memphis 37	HRV 16 A	*Plasmodium falciparum*	HRV 14B/16A	Pre-Alpha	Strain A2	Dengue
H3N2 Wisconsin/05	New RSV A*	HRV 14B			Delta		
H1N1 France/21	New RSV B* London				Omicron BA.5		
H5N1 *Attenuated*							
Flu B Connecticut/01 Victoria lineage							
H3N2 England/22							

Potential additional challenge study models for development:
- SARS-CoV-2 additional strains and seasonal coronavirus
- Parainfluenza virus
- Norovirus, rotavirus
- Zika virus
- *Bordetella Pertussis*
- *S. Pneumonia*

*** In development**

Figure 2: hVIVO's portfolio of challenge agents continue to expand and include viruses, parasites and bacteria while hVIVO's state-of-the-art facility, with segregation capabilities, allows several different pathogens to be run simultaneously.

CONCLUSIONS

Our new state-of-the-art facility at Canary Wharf allows for high throughput, high quality clinical study conduct, accelerating your product to market. The design and capacity of the facility also allows the simultaneous conduct of studies that require different viruses.

ACKNOWLEDGEMENTS

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REFERENCES

Anti-terrorism, Crime and Security Act 2001, https://www.legislation.gov.uk/ukpga/2001/24/schedule/5