



Public Health  
England

# MS Porton Down

## Microbiology & Translational Research

### Mission – Public Health England

“To protect and improve the nation’s health and to address inequalities, working with national and local government, the NHS, industry, academia, the public and the voluntary and community sector.”

**Phil Marsh**

on behalf of Miles Carroll

# PHE - Porton

Porton



- emergency response capability
- high containment of pathogenic agents [CL2-CL4]
- diagnostic capabilities [RIPL]
- culture collection (CC of PHE)
- developmental production
- biopharmaceutical manufacture
- **translational research**



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# An Integrated Capability for the Development of Interventions

Development route is *in vitro*, *in vivo*, product development and clinical studies



**Discovery**

Applied research



**Development**

Translational research



**NVEC**

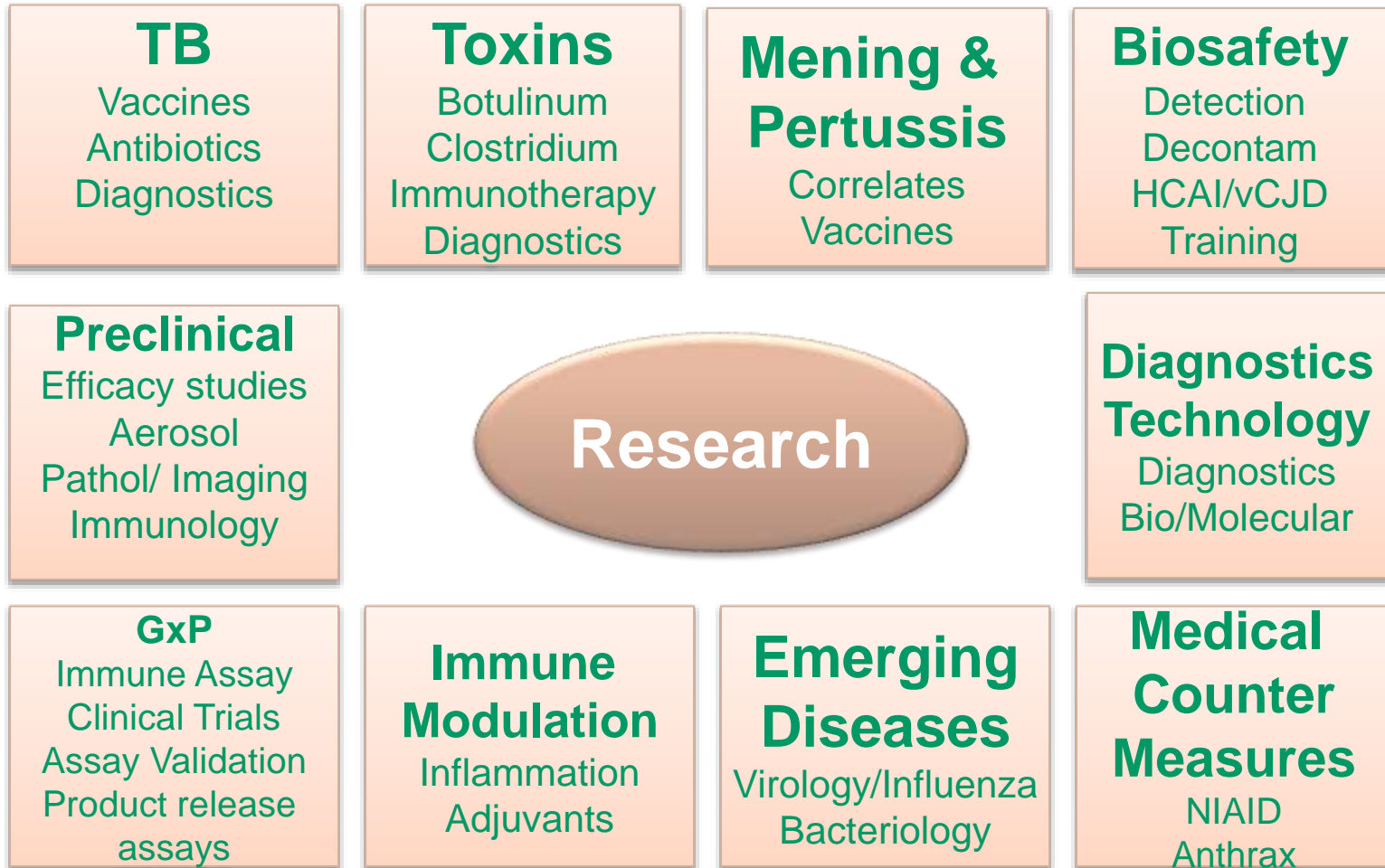
**Licensure**

**Working with Partners** to develop interventions.

Past successes: Whooping cough, Meningitis, Anthrax, Plague, **Dysport (cerebral Palsy)**, **Erwinase** (childhood leukaemia treatment), Decontamination products



# Infectious Disease Programmes



Developing Interventions with academia, Govt and industry

# Capabilities - Chemostat



## Pure culture:

- *Neisseria gonorrhoeae*
- *Legionella pneumophila*
- *Salmonella enteritidis*
- oral opportunistic pathogens
- *Mycobacterium tuberculosis* / *M. bovis*

## Conditions:

- Carbon limitation
- Nitrogen limitation
- Iron limitation
- Growth temperature
- Growth rate

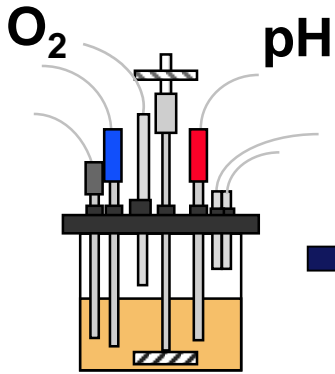


# Application of chemostats to drug evaluation

Development of a rapid assay

Definition of live, dead, and drug tolerant (persisting) bacteria

Fluorescence stains and flow cytometry

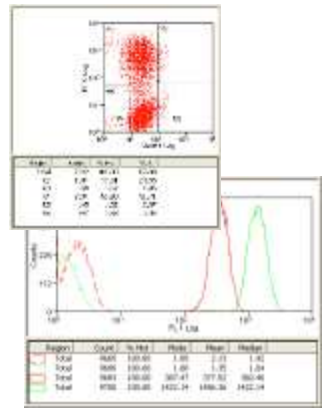


- 96 well plate
- Drug combinations
- Fluorescent stain
- Fix
- Flow cytometry

Host-like conditions  
Slow growth  
Stationary phase

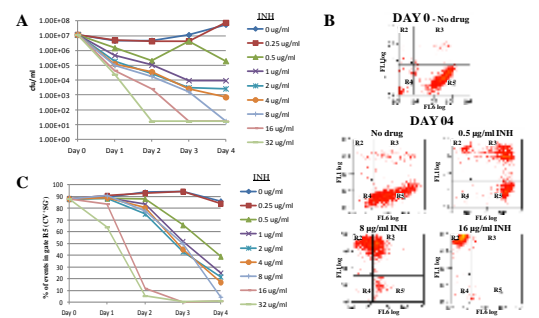
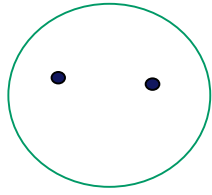
**Reproducible  
source of cells**

**Biofilm  
models**



**Defined populations:**

- Live
- Dead
- Persistent



**CL3 cell sorting:**  
- defined bacterial populations for further analyses



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# Preclinical testing at Porton Down

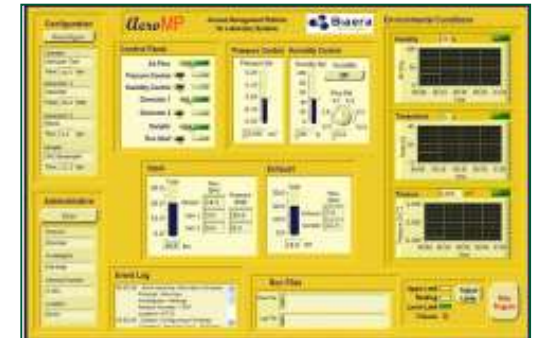
- Range of models.
- Immunogenicity and challenge studies.
- ACDP3 containment facilities: *in vitro*,  
*in vivo*, *ex vivo* studies.
- Large capability  
(largest TB vaccine evaluator in Europe –  
small animal models).



# Aerobiology expertise

## Aerosol Generation

- Nebulisers generate particles in respirable range  $<5 \mu\text{m}$ .
- Henderson Apparatus controlled by Aero-MP (relative humidity, flow rates, exposure times, suspending fluid).
- Directional flow systems - (bespoke 'sow' system or individual mask).
- Plethysmography equipment.
- Reproducible, low dose (5-10 cfu), even distribution.







- Haemorrhagic Fever viruses

*Filoviridae*

*Arenaviridae*

- Arboviruses

*Flaviviridae*

*Bunyaviridae*

*Togaviridae*

*Reoviridae*

- Orthopoxviruses
- Hantaviruses
- Henipaviruses



World Health Organization

**WHO Collaborative Centre for Viruses  
(Arboviruses & VHF)  
Porton Down 1976**



# PHE Porton: Unique Translational Research Capability

## New antigens:

- meningitis
- TB
- anthrax
- *C. difficile*

## Correlates of protection:

- meningitis
- pertussis
- TB

Translational R&D

## Evaluation [clinical trials]:

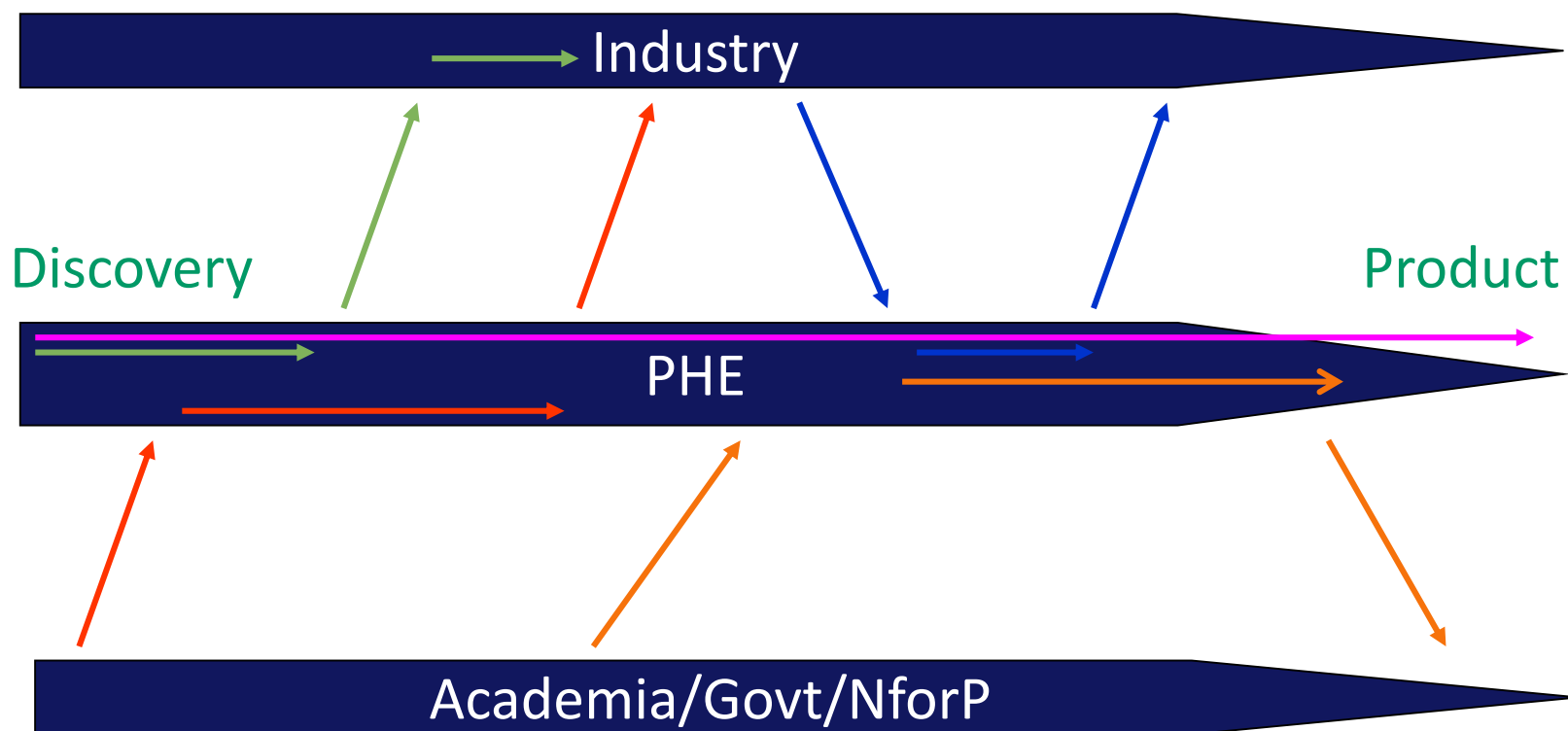
- NVEC
- grants
- commercial

## Evaluation in preclinical models: [drugs, vaccines, etc]

- medical counter-measures
- TB
- 'flu
- .....& many others....



# Translational Research Model



PHE plays a pivotal role in translating Research into future health care interventions