

DIABLO: Detection of Infectious Agents By Laser Optics

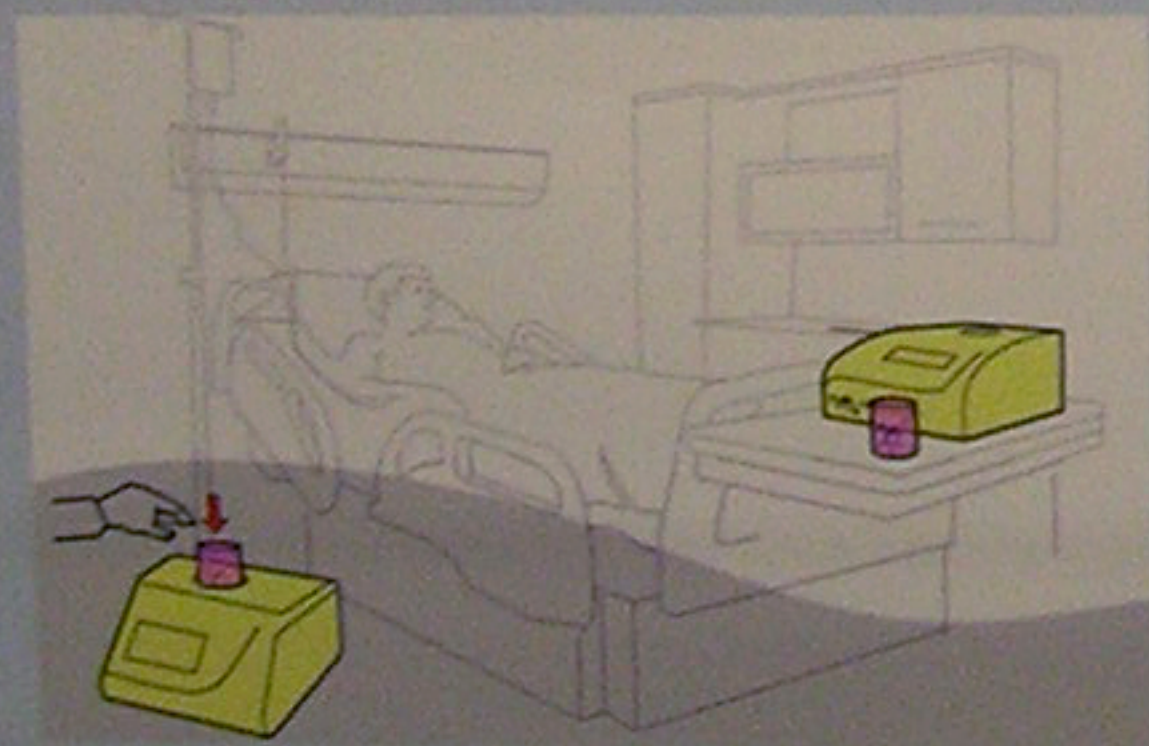
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Volatile organic compounds and the gut

It has been established since the 1980s that bacteria can be identified on the basis of the different mixtures of volatile organic compounds (VOCs) which they emit. Moreover, substantial anecdotal evidence points to a distinctive odour associated with the faeces of patients suffering from *Clostridium*-associated disease (CDAD). We hypothesised that this odour was associated with the presence of the active bacterium and that the volatile organic compounds giving rise to it would be detectable analytically.

Derangements in the microbial population of the gut are also associated with a range of common and serious medical conditions, not just infection, affecting many parts of the body:

- CDAD
- Inflammatory bowel disease
- Colorectal cancer
- Diabetes (Type 1 and 2)
- Autism-spectrum disorders
- Arthritis
- Allergies
- Neurological disorders



Concept instrument

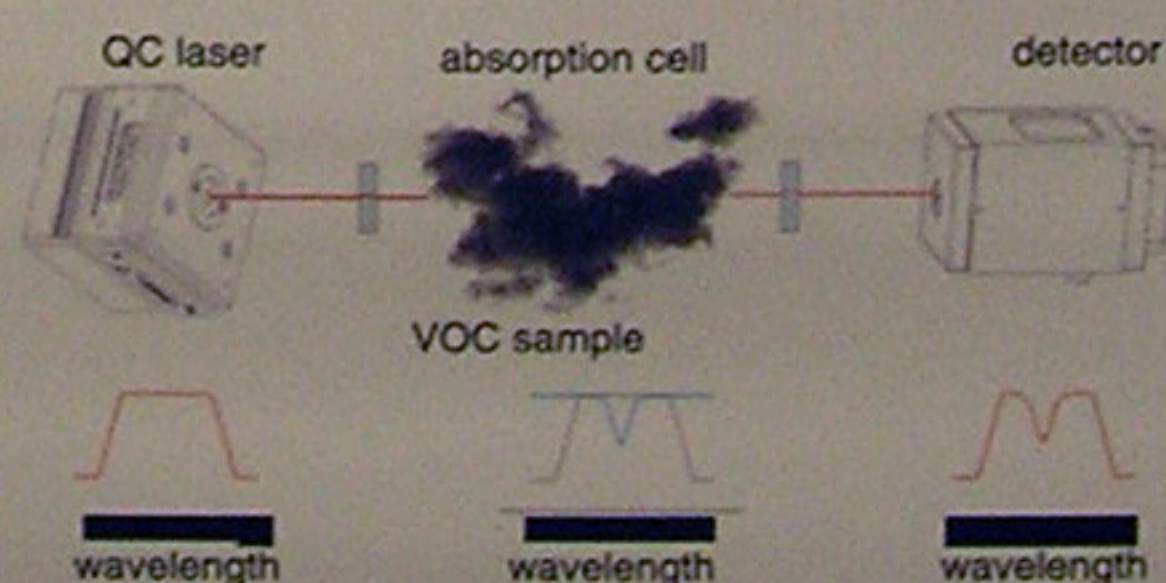
Bedside, point-of-care
VOCs from faecal headspace

Instrument for point of care diagnosis

Clinical trials of prototype - MHRA approval pending
Detection of infection in acute-care patients via analysis of ventilator sidestream breath

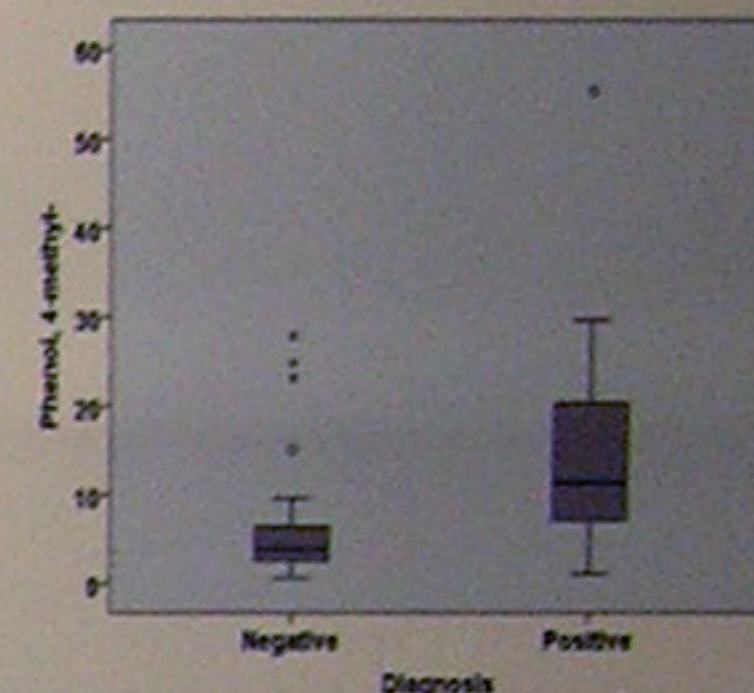
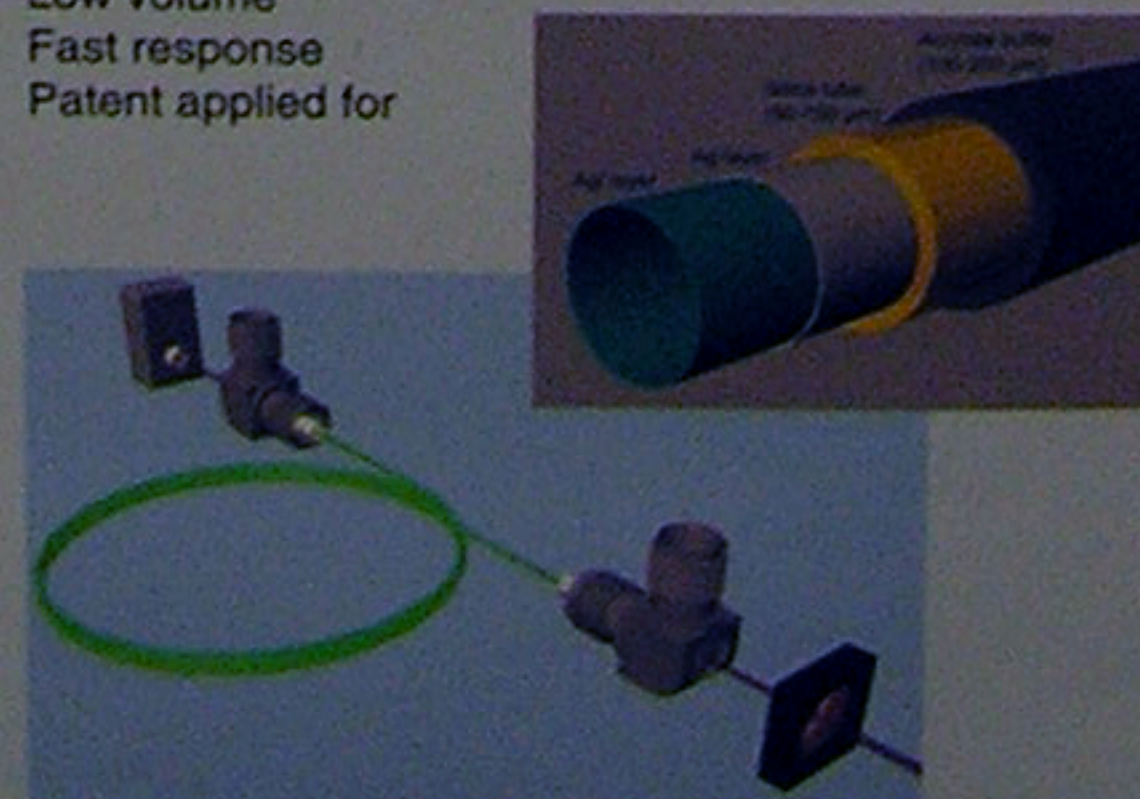


High resolution laser spectroscopy of VOCs

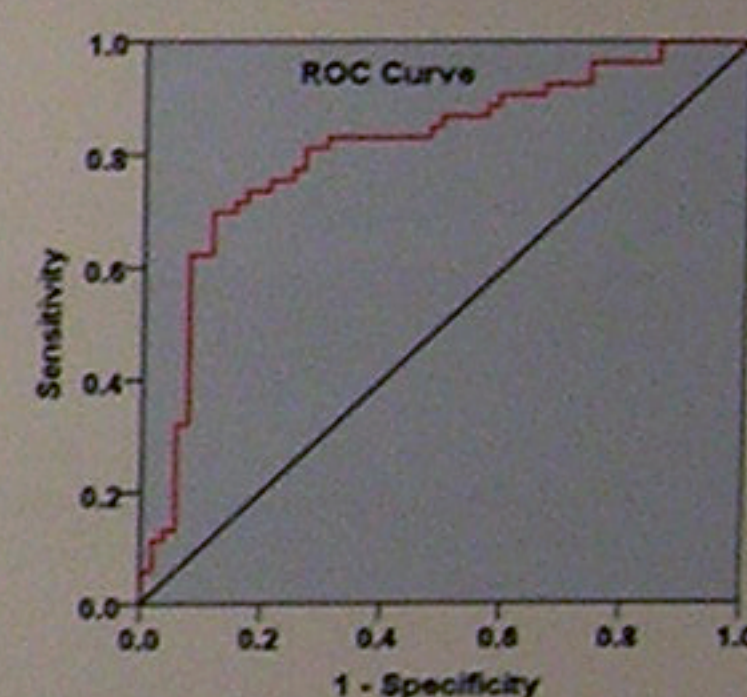


Novel optical cell

- Hollow silica waveguide
- Low volume
- Fast response
- Patent applied for



Emission rate of para-cresol (4-methyl phenol) in patients with and without CDAD



Receiver-operator characteristic (ROC) curve for para-cresol: similar performance to current tests for CDAD.

Novel volatile biomarkers

- Identified using classical analytical methods
- Performance (sensitivity / specificity) comparable to current tests
- Para-cresol (4-methyl phenol) suitable for optical determination
- Patent applied for



Wider application

- Medical diagnostics in other matrices: blood, urine and breath
- Food security
- Environmental health
- Bioprocessing
- Soils analysis

The challenge

Current diagnostic tests for CDAD have limited performance and require samples to be transported to a laboratory for testing. Our aim is to develop an instrument capable of diagnosing CDAD on the hospital ward within a few minutes.

Existing tests and methods based on traditional analytical instruments cannot meet this challenge: a novel approach is needed.

Acknowledgements

