SapientSensors

Customised Medical Diagnostics
Proposition

Creation of a low cost, single use diagnostic sensor for use in a hand held monitor providing Point of Care customised screening for Tuberculosis without requirement for pathology laboratory support
USP

• Sapient Sensor's diagnostic
  – Detects a "signature" of multiple biomarkers
    • increases precision for a specific strain
    • allows detection of various TB strains simultaneously
    • allows detection of active and latent TB
  – Does not require recourse to pathology and can be applied in the field by part-trained operators
  – Forms a platform capable of extension to other diseases eg Bovine TB
Market

• Current established competitor tests
  – Smear microscopy
    • 88M tests pa
    • average cost £1-10 per test
  – Chest X-ray
    • 50M tests pa
    • average cost £2-10 per test
  – Culture
    • 17M tests pa
    • average cost £8-20 per test
Sapient Sensors’ Technology

- Conducting CNT backbone laid down via inkjet printing on a plastic substrate supporting a nanoscale grid
- Synthetic “antibodies” (aptamers) attached to the cnt backbone
- Aptamers customised for specific biomarkers of the disease to be detected
- Measure conductivity change on “binding” event relative to a reference
- Base technology applicable to all diseases
- Device driven by mobile phone
- Epidemiological data automatically reported back to HQ
Aptamer Strand Wrapped Around a Carbon Nano Tube
Sapient Sensors’ Technology

Measurement via Templated Biomarker-Receptive Aptamer (A)

Reference via Templated Biomarker-Capped Aptamer A*)

Gold Tracks 10 micron apart
Sapient Sensors’ Technology

Measurements via upto Five Different Biomarker-Receptive Aptamers (A)

Reference via upto Five Different Biomarker-Capped Aptamers (A*)
Sapient Sensors’ Technology

Substrate: Silicon Wafer with Oxide Coating

Measurement and Reference Track Sets
- Each Set Interdigitated

Body Moulding: cf Digital Camera Memory Card

Detachable PE Sealing Film
State of Development

• Sapient Sensors has exemplified its base patent on silicon using biomarkers correlated with a wide spectrum of diseases
  
  - Lysozyme
    - Atherosclerosis
    - Atheroma
    - Stress
  
  - Thrombin
    - Cardiovascular Disease (via anticoagulation activity)

• Technology is at TRL4
Patent Summary

• PCT Patent WO 2012/131403 published October 2012
• A device for identifying the presence of a specific target molecule or biomarker by the detection of a change in an electrical property, the device including a measurement sensor comprising:
  – a conducting or semiconducting sensor structure capable of conjugating with the biomarker, thus giving rise to the said change in electrical property, and
  – an electrode system for conducting a signal from the device;

in which the device includes a further such sensor, of substantially identical form but having its sensor structure already conjugated with the biomarker, so as to act as an internal reference.
Technology Strategy Board Programme

- Rapid Diagnosis for Human and Bovine Tuberculosis begins 01/11/13
- Developing bTB device with the following partners:
  - **CompanDX** develops bioinformatics algorithms to identify biomarkers
  - **CPI Innovation Services Limited** runs the UK Centre of Excellence for Printable Electronics. The Centre was established to facilitate new product prototyping, scale-up and the development of pilot-scale production lines
  - **Health Protection Agency (HPA Porton)** provides specialist and reference microbiology services for high containment pathogens, translational research programmes and the manufacture of biopharmaceutical products
    - **Agri-Food & Biosciences Institute (AFBI)** is a leading provider of scientific research and services to government, non-governmental and commercial organisations
    - **Nottingham Trent University** (Division of Biosciences) provides analytical characterisation
THANK YOU

Keith Robson
M: +44 7823 553 675

Sapient Sensors Limited
at The Centre for Process Innovation Ltd,
PETEC, Thomas Wright Way, NETPark, Sedgefield, Co Durham TS23 3FG

Email: keith.robson@sapientsensors.com