

Multiplexed diagnostics

Simultaneous sample testing will improve the productivity of drug discovery while reducing the economic burden of disease.

Driven by an aging population, higher expectations and improved patient knowledge, the need for innovative medical treatments is accelerating. As a natural consequence, management in the private and public sectors are focused on both improving the speed to market of new medical products and services while generating economies and efficiencies as a means to improving the financial and social returns to both shareholders and taxpayers.

Improving productivity

A common component in both the provision of patient health care and drug discovery is the need for testing and analysis of samples. Traditionally, tests are performed one at a time, serially or in parallel. One obvious way of improving productivity would be to carry out multiple tests concurrently, in a single vessel – a technique known as multiplexing.

SmartBead, originally a spin-out of Cavendish Laboratory, University of Cambridge, has developed a powerful multiplexing solution, UltraPlex™, which improves

the speed, efficiency and cost of diagnostic testing and drug discovery.

SmartBead has taken well-established technologies from the microelectronics industry and combined them with existing bioassay technologies to provide scientists and physicians with the tagging and tracking benefits of bar codes but at a microscopic level. By attaching individual test molecules to physically bar-coded metal microparticles, multiple tests may be tracked and analysed simultaneously. In effect, the UltraPlex technology ‘bar-codes molecules’ and has the capacity to multiplex from two to millions of individual tests at the same time. The key benefits of multiplexing, and the associated miniaturisation of assays, are more information from each test sample, significant savings in sample volumes, reagents and labour and greatly improved throughput.

Assessing effectiveness

Over the last 20 years, diagnostic testing has evolved dramatically and its importance in the provision of healthcare and patient management will

continue to grow. Every year, thousands of routine tests are performed in individual hospitals around the world. Tests are no longer performed just for the initial diagnosis of a disease, they are also performed for assessing the prognosis of a disease and patient management in general. Theranostics, a sub-group of diagnostics, will be increasingly used to choose and assess the effectiveness of a particular therapy for individual patients providing ‘the right drug for the right patient at the right time’.

Multiplexing diagnostic and theranostic testing represents a genuine opportunity to reduce some of the pressures on both healthcare professionals and budgets while providing real benefits to patients.

Fingerprint revolution

Looking forward, SmartBead intends to revolutionise the provision of clinical diagnostics by introducing rapid, cost-effective products that measure hundreds or even thousands of analytes concurrently. By coating UltraPlex microparticles with proprietary libraries of antigens or antibodies it is possible to

generate a patient’s metabolic profile, or ‘fingerprint’ from a blood sample. A single *in vitro* test could provide information on the levels of thousands of biomarkers simultaneously. UltraPlex represents a major step towards a point-of-care molecular health check, when a single blood sample, analysed in real time, will yield a reliable, cost effective, diagnosis of tens or even hundreds of diseases at the same time.

Multiplexed tests will facilitate earlier and more accurate diagnosis, and will reduce the total cost of care and the economic burden of disease. In short, multiplexing will assist in improving public health while contributing to national wealth by generating economies in the treatment of disease, preventative medicine and also pharmaceutical development. **END**

About the company

SmartBead Technologies Ltd develops multiplexed assays and technologies for applications in diagnostics and drug development. The company is based in Cambridge, UK. Author Robert Booth is CEO of SmartBead Technologies.