

# An innovative medical solution

**W**e live in an era where the need for innovative medical treatments is accelerating. The population is living longer, with an attendant increase in the burden of chronic diseases, and improved patient knowledge is driving higher expectations and a demand for improved quality of treatment and care. Concurrently, the cost of developing new drugs has been rising, and health service budgets are under increasing pressures and scrutiny. Not surprisingly, management in both the public and private sectors are heavily focused on both improving the speed to market of new drugs and medical services, and achieving economies as a means to improving the financial and social returns to shareholders and taxpayers.

A common element in both drug discovery and the provision of healthcare is the need for testing or screening compounds or patient samples. Traditionally, tests or assays are performed serially, one at a time or in parallel. One obvious way of improving productivity would be to carry out multiple assays simultaneously – a technique known as multiplexing. SmartBead Technologies Ltd, a spin-out of the world renowned Cavendish Laboratory, University of Cambridge, has developed, and is currently launching, a powerful multiplexing solution, UltraPlex™, which will improve the speed, efficiency and cost of drug development and diagnostic testing. 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 barcodes at a microscopic level.

UltraPlex™ provides multiplexed bioassays, whereby individual test molecules are attached to physically barcoded metal microparticles, so that multiple tests may be tracked and analysed simultaneously in a single vessel. One drop of liquid could contain many thousands of UltraPlex™ microparticles. In effect, the technology barcodes molecules and has the capacity to multiplex from two to millions of individual tests simultaneously. Key benefits from the technology are quicker test results, the generation of more information from each test sample and decreased labour, patient sample and reagent requirements. SmartBead's technology was recently successfully evaluated in an independent, DTI funded study which concluded that microparticle array platforms have the potential to substantially improve the efficiency and economics of performing assays with consequent economic and social benefits to the UK economy.

Looking forward, one of the most important developments in the provision of healthcare and patient management will be the growing importance of diagnostics. Over the last 20 years, diagnostic testing has evolved dramatically. Every year, hundreds of thousands of routine tests are performed in UK hospitals and, of course, this situation is replicated around the world. Vastly improved knowledge of disease pathology also means that tests are no longer performed just for the initial diagnosis of a disease, but are also used 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

*Multiplexing for improved national health and wealth...*

the right patient at the right time.' Increasing diagnostic and theranostic testing represents a genuine opportunity to reduce some of the pressures on both healthcare professionals and budgets, whilst at the same time providing real benefits to patients. Multiplexing existing and future assays will provide leverage for these social and economic benefits.

In his 2002 report 'Securing our Future Health: Taking a Long-Term View', Derek Wanless cited better productivity in the use of NHS resources as being a necessary and key factor in achieving a high quality health service. Multiplexing will assist in improving public health, whilst also contributing to national wealth by generating economies in preventative medicine and in the treatment of illness. Multiplex tests will facilitate earlier and more accurate diagnosis, and will reduce the total cost of care and the economic burden of disease. Multiplexing will further contribute to national health and wealth by providing efficiencies and economies in drug discovery and development, the benefits of which will flow to both patients and the NHS.



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