

Conference Report

Health Research – Partnerships for Success

R&D Conference, 22 November 2012

Preface

In December 2011, the UK Government launched its Life Sciences Strategy. A stated aim was to “... bring our science base and the NHS together to ensure the UK is the best place in the world for companies to invest in the discovery, development and commercialisation of medical innovations.”

Nearly a year on, the Association for the British Pharmaceutical Industry (ABPI), the BioIndustry Association (BIA) and the NIHR Office for Clinical Research Infrastructure (NOCRI) came together to take stock of recent progress towards this goal. Representatives from industry, academia, the NHS and Government were invited to present their perspectives on the changing face of UK health research, and how new partnerships and alliances are impacting on the development of new medicines.

It was encouraging to see the audience of the conference almost evenly split between industry, academia and the health service. It is our belief that partnerships are of paramount importance to the development of new medicines to tackle the major health challenges the UK – and the wider world – now faces. We hope this summary of a stimulating and constructive conference will illustrate how successful partnerships are placing the UK in an excellent position to address these medical challenges and reaffirm its world-leading status in biopharmaceutical development.

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Executive summary

The past five years have seen profound change in UK health research. The health research landscape is a complex ecosystem, spanning the NHS, academia, industry, patients and other stakeholder groups. Notably, all these parties are now fully aligned, working towards a shared goal – the rapid development of safe and effective medicines.

New partnerships have been established that recognise the vital and complementary roles played by each stakeholder group, including industry. Old boundaries and barriers are dissolving, encouraging greater dissemination of knowledge and movement of people across sectors. Greater openness and collaboration will be essential if progress is to be made against complex and poorly understood conditions, from respiratory disease to dementia.

Health research has been identified as a national priority in the UK, with the NHS providing a unique competitive advantage. An extensive infrastructure has been established to support research within the NHS, and considerable public funding has been committed to translational and health research.

Operationally, procedures are being simplified and streamlined to ensure that the UK remains an attractive location in which to carry out health research. The public are integral partners in these endeavours, and enthusiastic supporters of health research.

Integration of research into routine care – with every patient a potential research participant – and use of routinely captured health data are opening up exciting new opportunities. These rich data sources promise to have a transformational impact across multiple areas, from clinical trial design to enhanced outcomes research.

While challenges remain, the rapid progress made through the partnership approach is having a profound impact on health research in the UK – and, most importantly, accelerating the development of much-needed new medicines.

Introduction

Pharmaceuticals are a major UK success story. Some 20 per cent of the world's best-selling pharmaceuticals originated in the UK. The industry invests £4.5bn in research and development (R&D) every year, accounting for 35 per cent of the UK's entire industrial R&D expenditure.

Industry is able to draw upon the UK's world-class academic life science research base. By any measure, the UK science base generates a substantial volume of

high-quality research, providing the understanding and initial leads to support the development of new medical therapies.

The UK has a further distinct advantage – the NHS. Potentially, anonymised health data are available for an ethnically diverse population of more than 50 million people. As well as all being potential participants in research, their health records also capture vital information about their reactions to medication and medical history.

Independently, these three areas represent significant UK strengths. Yet when they come together, their benefits are multiplied manifold. The potential value of cross-sector partnerships has now been widely recognised, and important steps have been taken at all levels – from formal Government policy, through organisational restructuring, to active collaboration on the ground – to ensure that it becomes a reality. While the journey is by no means complete, the 'Partnerships for Success' conference heard strong evidence that the destination has been agreed, the route has been identified, and the first key steps taken.

The innovation ecosystem

The development of pharmaceutical products takes place in a dynamic and increasingly diverse ecosystem. No longer can academia be seen as the source of targets and basic knowledge which the pharmaceutical industry then licenses to develop medical products. Boundaries between these sectors and small biotechnology companies have blurred, multiple partnerships have been established, and central position of the NHS and of patients and the public has been recognised. Of fundamental importance, however, is the fact that all parties share a common interest – the rapid development of safe and effective medicines.

As summarised by **Stephen Whitehead**, Chief Executive Officer of the ABPI, several factors make the UK an ideal location in which to develop new medicines. Its underlying science base is strong and it hosts a substantial and successful pharmaceutical industry.

Of profound significance, the NHS provides an integrated framework of healthcare for more than 50 million people. The NHS therefore offers unrivalled access to huge patient populations, as well vast amounts of data captured in electronic health records. No other country can offer equivalent opportunities for health-related data collection and analysis on such a scale.

Even so, the industry faces challenging times, and is undergoing considerable evolution as it seeks to maintain a pipeline of new medicines to meet the health needs of

the UK and the rest of the world. Globally, industrial R&D productivity has been in decline, sparking multiple initiatives to replenish drug development pipelines. Important trends have included externalisation of research, smaller and better networked R&D operations, closer relationships with biotechnology companies, and more open innovation and joint precompetitive research with industrial and academic partners.

Increasing use of health record data and outcomes analysis is a further important trend, as UK regulatory agencies focus on cost-effectiveness as well as efficacy. A shift towards patient stratification and improved targeting of medicines has profound implications for companies' business models and the design of clinical trials.

Dr Mike Hutton, Chief Scientific Officer at Lilly, highlighted exciting emerging opportunities in medical science, from genomics to stem cell therapies, as well as the health benefits that have been gained in the past. Life expectancy in the UK has increased by 60 per cent since 1901, and 40 per cent of the increase in the 1980s and 1990s could be ascribed to new medicines. As industry adapts to changing circumstances, a thriving ecosystem is needed to ensure this progress is maintained.

Dr Hutton also stressed the importance of a receptive environment for new therapeutics. Without a vibrant marketplace, companies may be discouraged from investing in a country. From a practical perspective, comparing new medicines with best current treatments is difficult if those treatments have not been widely adopted.

The policy framework

Lord Howe, Parliamentary Under-Secretary of State for Quality, outlined some of the ways that the Government has been promoting health research in the UK and patient participation in research, particularly through the **National Institute for Health Research (NIHR)**. In 2012, for example, substantial funding was awarded for **NIHR Biomedical Research Centres** and **Biomedical Research Units**, while funding will be announced in 2013 for **Academic Health Science Networks** – partnerships spanning the health service, academia and industry whose remit will be to drive forward the uptake of innovative treatments in the NHS.

An important signal has been the commitment to research built into the flagship **Health and Social Care Act 2012**. The Act positions research as a core activity within the NHS but also mandates new commissioning systems to promote research-based evidence. A new consultation on updating the NHS Constitution also provides an opportunity to reaffirm and strengthen the opportunity for patients to contribute to health research, through trials and analysis of health record data.

The new **Clinical Trials Gateway** provides a single access point to UK studies registered in clinical trial registries, enabling clinicians and patients to identify relevant trials more readily.

The infrastructure

Several speakers discussed efforts being made to make the UK a more attractive setting for health research. **Mark Samuels** emphasised the important role played by the **NIHR Clinical Research Networks**, which provide access into the UK health research system across a range of disease areas. Through this infrastructure, some 600,000 people were enrolled in clinical trials in 2011. With new funding for NIHR Biomedical Research Centres and Biomedical Research Units, and for a nationwide network of NIHR Clinical Research Facilities, the aim is to create the destination of choice for first-in-human studies.

The UK's national healthcare and research system is undoubtedly complex. One area where processes have been simplified is in new **NIHR Translational Research Partnerships**. Two such partnerships have been established to date, in joint and related inflammatory diseases and in inflammatory respiratory disease (see Case Study 1), with the NIHR Office for Clinical Research Infrastructure acting as coordinator and single point of entry for both. By establishing standardised agreements and documentation across multiple partners, the initiative has greatly simplified the processes required to initiate projects.

Simplifying procedures has also been a core goal of the new **Health Research Agency (HRA)**, described by its Chief Executive **Dr Janet Wisely**. The HRA was established in 2011 to protect and promote the interests of patients and the public in health research. It plays an important role in coordinating ethical review of proposed studies, assessing some 6,000 applications a year.

Dr Wisely described a number of initiatives being undertaken to streamline and simplify procedures, for example by distinguishing routine from novel studies and concentrating on unmanaged risk. Ultimately, this should lead to speedier decisions, and more simple and consistent systems, while maintaining confidence in decision-making.

Of major practical significance has been a new '70-day' benchmark, requiring centres to recruit their first patients within 70 days of receiving a valid research application. This has been introduced into NIHR funding contracts from December 2011 and performance against this benchmark will affect NIHR funding to providers of NHS services from 2013.

CASE STUDY 1: Joint working

NIHR Translational Research Partnerships provide convenient access to world-leading researchers and well-characterised patient populations.

The growth of open innovation reflects the potential benefits all parties can gain from enhanced interactions during early stages of translation. Industry gains access to academic expertise and well-characterised patient cohorts. Academia can draw upon industrial resources and drug development skills. And patients benefit from accelerated development of drugs. NIHR Translational Research Partnerships illustrate this principle in action.

Following an open competition, two partnerships were funded: in Joint and Related Inflammatory Disease and in Inflammatory Respiratory Disease. For both, the NIHR Office of Clinical Research Infrastructure (NOCRI) acts as a single entry point for external partners.

The Joint and Related Inflammatory Disease Partnership, led by Professor John Isaacs in Newcastle, brings together nine leading academic clinical research centres across the UK, including seven NIHR Biomedical Research Centres. Alongside well-characterised patients spanning multiple disease

conditions, the consortium also provides access to Clinical Research Facilities for Experimental Medicine studies, as well as expertise in key areas such as pre-clinical models, biomarkers and tissue assays.

Indeed, the model is highly flexible. While early experimental medicine studies were the initial priority, projects have actually focused on a wider range of translational stages, from pre-clinical testing to clinical trials. It is also a genuine partnership: academic input can have a significant impact on industry thinking – for example, potentially shifting the disease target of one agent in development from rheumatoid arthritis to Sjögren's syndrome.

One of the Translational Research Partnerships' strongest selling points is the easy access to multiple sites and patient groups, and consequent swift delivery. Standardised systems have been established to streamline procedures. As at November 2012, three industrial project contracts have been signed and several others are at advanced stages of discussion. And as well as pharmaceutical and biotechnology companies, Translational Research Partnerships may be of value to diagnostic and medical device companies, providing strategic and practical advice on clinical research programmes.

One of the most exciting prospects in UK health research is the analysis of data routinely collected within the health system, particularly primary care. **Dr John Parkinson** outlined the critical role played by the **Clinical Practice Research Datalink (CPRD)**.

The CPRD collates data on some 53 million people registered with the NHS, and is also beginning to integrate data from multiple sources, including social care. It provides opportunities for observational studies, analysis of routinely collected data, and also recruitment of patients into trials at the point of healthcare contact. The range of questions that can be addressed is therefore extremely broad, while its multiple potential benefits in research include randomisation at point of care, rapid inclusion/exclusion decision-making, and real-time data collection during trials. Case Study 2 illustrates how ehealth systems can underpin innovative clinical trial methodologies.

While the NIHR funds the UK's unique health research infrastructure (and much research that takes place within it), the **Medical Research Council** is increasingly supporting translational research drawing on NIHR facilities. It has also established new partnerships with industry – a sea-change summarised by its Chief Executive **Sir John Savill**.

The recent decision to include collaboration with industry as an integral part of the MRC's mission sent an important signal. Industry has been at the heart of several key MRC-funded initiatives in recent years, including support for a collaboration involving teams in Liverpool and Manchester, led by Professor Kevin Park, and the Imanova partnership encompassing the MRC and academic centres in London which has taken on responsibility for GSK's clinical imaging centre.

A particularly significant new venture has been the £180m **Biomedical Catalyst** fund, run jointly by the MRC and the Technology Strategy Board, to promote innovation in healthcare. Funding has been awarded to cross-sector consortia led by academic or industrial partners, for exciting projects including new diagnostic imaging in dementia and flu vaccine development.

The MRC has also engaged in open innovation projects with industry. It has funded 15 projects based on access to a library of deprioritised compounds developed by AstraZeneca, including the possible repurposing of a prototype prostate cancer drug for Alzheimer's disease. The potential for similar partnerships is being explored with other companies.

CASE STUDY 2: A breath of fresh air

The Salford Lung Study may be the world's first pre-licensing clinical trial run within a primary healthcare system.

To demonstrate efficacy, phase III clinical trials typically limit as many variables as possible, involving carefully selected patients treated under rigorously controlled conditions. Such situations are a far cry from how medicines are used in practice. With regulators increasingly demanding data on cost-effectiveness, the prospect of gathering data under 'real-world' conditions is enticing. A possible pointer to the future is the innovative Salford Lung Study, a partnership led by **Dr David Leather** at GSK and **Professor Martin Gibson** at the University of Manchester, which is running a phase III randomised controlled trial embedded in routine clinical care.

The project emerged from a desire at GSK to assess the effectiveness of Relovair, a new treatment for

chronic obstructive pulmonary disease (COPD) and asthma. The Salford area provided a potential platform to run the trial, and discussions with regulatory authorities helped shape how such a unique study should be organised.

Several features made Salford a suitable testbed. Importantly, through North-West eHealth, it already had a technical infrastructure to support data-gathering in primary care. It also had a single 'paperless' teaching hospital keen to participate. A significant challenge was to connect up the 60 or so local pharmacies, to ensure that real-world prescribing data were also captured.

The industry-academia partnership has expanded to include multiple other groups, encompassing primary and secondary care and community pharmacies, as well as the expertise of the NIHR Clinical Research Network. While the technical infrastructure has played a key enabling role, the success of the project has also relied on the commitment and 'can do' mentality of all these multiple stakeholders.

The MRC has also partnered with the ABPI on an innovative programme to develop a better understanding of respiratory disease (see Case Study 3), where the medical challenges are so great that a collaborative approach is likely to lead to more rapid progress.

The industrial perspective

How is industry responding to changes in the UK health research landscape? GSK's **Dr Adrienne Clark** provided an analysis of data from ABPI members which, although based on small numbers, provides some insight into current practice and perceptions.

CASE STUDY 3: Breathing easier

Respiratory problems such as chronic obstructive pulmonary disease (COPD) are a tough nut to crack, and require a coordinated approach spanning industry and academia.

COPD is a huge medical problem, predicted to be the third leading cause of death globally by 2020. As an archetypal complex disease, the term COPD encompasses multiple forms of poorly understood disease. Treatment options are limited. Given the scale and difficulty of the problem, it is now widely recognised that more progress can be made by interdisciplinary collaboration to better understand disease mechanisms and characterise potential targets – a reality enshrined within a new partnership funded by the MRC and the ABPI.

The initiative grew out of a 'sandpit' meeting held early in 2010, involving academic and industrial researchers, which identified priority areas for research. Four work packages were subsequently funded:

- Phenotyping: in-depth characterisation and stratification of patients, establishment of a bio-resource and shared IT infrastructure
- Infection and immune mechanisms
- Tissue repair and injury
- Protection of skeletal muscle.

Each work package has joint heads from academia and industry. The initiative itself also has joint leads, **Professor Chris Brightling** from Leicester and **Dr Alasdair Gaw** (formerly AstraZeneca and now Technology Strategy Board). It spans 14 academic centres across the UK and four (soon to be seven) major pharmaceutical companies.

A collaboration on this scale requires considerable commitment and is undoubtedly operationally challenging – not least in establishing compatible information and knowledge transfer systems. Yet scale also has its advantages, providing a uniquely powerful platform to understand disease mechanisms, stratify patient groups, and provide a firmer foundation for the development of effective therapeutics.

Industry is focused on key criteria such as speed of set-up, reliability of patient recruitment, and quality. Perceptions of past performance have been negative, reflected in the drop in the numbers of trials recruiting their first patients in the UK over the past decade. However, there are encouraging signs that recent measures are having a positive impact, although there remains some distance to travel.

Recent years have seen an upswing in the numbers of trials recruiting their first patients in the UK. Studies are perceived to be starting sooner, though considerable heterogeneity remains and by no means all centres are hitting the 70-day target. Recruitment is the key criterion, and there are signs that this is improving – particularly for NIHR-adopted studies – though 100 per cent recruitment is far from routine. Overall, trends are positive and the industry welcomes the process improvements being introduced, the full impact of which is likely to take several years to be felt.

Dr Dennis Gillings of Quintiles provided a complementary perspective from the contract research organisation sector. He emphasised the convergence of research and patient care, generating data that will both provide insight into causal mechanisms, and hence support patient stratification, but will also enable greater focus on real world outcomes. The UK is well placed to take advantage of these trends. His data show that, although the number of UK patients in trials as a percentage of global totals declined during the 2000s, the past three years have seen a marked reversal of this trend at Quintiles.

Through the development of innovative methodologies, organisations such as Quintiles can be important parts of the pharmaceutical ecosystem. Opportunities may exist for novel, adaptive trial designs, such as that established for the US I-SPY2 breast cancer trial. More generally, he suggested, organisational and attitudinal changes have re-established the UK as a favourable environment in which to carry out health research.

The public as partners

Successful health research would be impossible without the active support of patients and the public. As pointed out by **Simon Denegri**, Chair of INVOLVE and NIHR National Director for Public Participation and Engagement in Research, patients and the public are overwhelmingly positive about health research and have important roles to play in shaping its success.

Through the NIHR, the UK has taken a lead role in public and patient involvement. **INVOLVE**, for example, has been established as an integral part of the NIHR. Patients are also viewed as partners, and have the opportunity to feed in at multiple levels, from policy and priority-setting to the design of individual studies – in one case increasing recruitment from 40 to 70 per cent by suggesting changes to the wording of literature. To date, industry has made less use of public input.

More generally, public and patient attitudes to research are very positive – indeed, there is a growing expectation that they will be involved in research, and care is needed to ensure that these expectations are actually met. Discussions about regulatory mechanisms suggest that the public take very commonsensical approaches, and want to see efficient procedures in place. The CPRD experience is similarly positive – opt-out rates are extremely low (one or zero in 95 per cent of general practices).

Perspectives

In summing up, **Dame Sally Davies**, Chief Medical Officer and Chief Scientific Adviser at the Department of Health, emphasised the profound and rapid transformation of the UK health research system – described by one journalist at a recent briefing as ‘Europe’s best kept secret’. This transformation has been fully integrated from top to bottom – from high-level policy statements enshrined in Acts of Parliament to operational procedures addressing day-to-day performance.

While this transformational journey is by no means over, many positives can already be identified. Some 600,000 participants were recruited to NIHR Clinical Research Network Portfolio studies in 2011, and 99 per cent of NHS Trusts have participated in research (60 per cent of them contributing to commercial studies). The number of global studies recruiting their first patients in the UK is increasing, and the medicines for children network is having particular impact.

Exciting scientific opportunities abound, and a wide variety of translational funding programmes are helping to progress these opportunities towards market application. Notably, industry is an integral partner in all these initiatives. With the additional flow of new knowledge likely to emerge from electronic health record data, the prospects for health research are exceedingly bright – good news for the UK’s health and wealth.

CASE STUDY 4: Safety in numbers

A novel cross-industry data-sharing partnership, brokered by the ABPI, is benefiting all parties by providing a clearer view of preclinical safety pharmacology models.

Safety issues are one of the most common causes of drug development failure. Because regulatory authorities specify what preclinical models should be used to assess safety in different organ systems, an opportunity exists to share data to gain a better understanding of how observations in animal models correspond to those seen in humans.

Through the Animal Framework, described by **Dr Lorna Ewart** of AstraZeneca, eight pharmaceutical companies have pooled preclinical safety data on more than 100 medicines for which phase I clinical data were also available. The ABPI has played a critical role as ‘honest broker’, anonymising data by stripping out any identifiers of source, chemical make up or target.

In terms of cardiovascular effects, data from the dog telemetry model have confirmed that abnormalities in ECG intervals identified in animals are a good predictor that effects will also be seen in patients. Results on blood pressure and heart rate are less predictive. As well as providing useful information to companies, the analysis is also of value to regulators, and should ultimately help in the development of more refined animal safety models. The results of the cardiovascular analysis are likely to be published in 2013.

As well as work on the cardiovascular model, the Animal Framework partnership is also pooling data on models, mainly rodent, used to assess effects on the respiratory system and central nervous system. It is also working with the National Centre for the Replacement, Refinement and Reduction of Animals in Research (NC3Rs) to find ways to store the data and manage future access.

Breakout sessions

Session 1: Enhancing experimental medicine studies

R&D productivity could be enhanced by innovative approaches, and novel partnerships, in early clinical development.

There is significant compound attrition in early human trials, particularly due to efficacy or safety issues. New approaches are being developed to increase success rates at this critical stage, to minimise the risk of failure at later stages.

Greater understanding of human disease provides insight into disease mechanisms and potential targets, and will support patient stratification. Over the long term, important information will come from the UK Biobank project, described by **Professor Sir Rory Collins**. Some 500,000 people aged 40–60 will be followed through life via their health records and other assessments, and will provide tissue samples for long-term storage. The project will generate a wealth of data across multiple conditions, alongside opportunities for analysis of biological materials. Data access is open to all *bona fide* researchers, in academia and industry.

In preclinical research, anonymised data sharing to enhance statistical robustness would be extremely valuable in helping to establish the strengths and weaknesses of specific animal models. A unique cross-industry partnership, brokered by the ABPI and described by **Dr Lorna Ewart** of AstraZeneca, illustrates how this can work in practice. Using the conscious dog telemetry model as an exemplar, eight pharmaceutical companies have provided the ABPI with preclinical data on their developmental compounds, a meta-analysis of which has provided a clearer view of the model's relationship to human drug responses (Case Study 4).

A third option, discussed by Pfizer's **Dr Peter Milligan**, is increased use of modelling and simulation in drug development. Modelling of physiological processes, informed by data from experimental studies, can be used to visualise the potential impact of various pharmacological interventions. It may have particular value in 'failure analysis', or identifying reasons why promising agents fail to achieve their anticipated effects, which can inform future strategies.

Session 2: Evolving models of R&D

Boundaries between academia and industry are dissolving – and progress is swifter as a result.

Two decades ago, industry and academia were different worlds, and contact between the two was limited. Recently, though, attitudes have softened and the potential benefits to both parties from collaboration have been more widely appreciated. This fundamental shift has spawned innovative new ways of working together, and sparked refreshingly original thinking on the future of pharmaceutical research.

Dr David Fox from the Royal Society of Chemistry, for example, promoted the idea that open innovation should extend through target validation and clinical proof of concept. Such an approach, he argued, would reduce duplication and redundancy and lower rates of attrition in drug development.

He also highlighted the shifting R&D landscape, which has seen several academic drug discovery units established within universities. It would be advantageous to connect this work better to clinical studies, perhaps through 'therapeutic centres of excellence' based around existing clusters of drug discovery and experimental medicine centres – providing 'line of sight' from drug discovery to patient.

Skills development is also an issue, particularly in areas such as medicinal chemistry and clinical pharmacology. The Royal Society of Chemistry has worked with other UK learned societies to develop an agenda to promote capacity building and skills development, and to encourage greater interplay between communities.

The changing environment is characterised by the emergence of new partnerships. The ABPI and MRC, for example, have joined forces on an initiative to tackle chronic obstructive pulmonary disease (COPD). The multicentre, multiparty **COPDMAP** partnership is attempting to further understanding of disease mechanisms and hence progress pharmaceutical development (Case Study 3).

A complementary approach, Translational Research Partnerships (TRPs), has been developed by the NIHR. Nationwide academic capability clusters have been established, initially in two disease areas, with academic researchers making a commitment to work with industrial partners. Industrial routes into the consortia are managed through NOCRI – providing industry with a single point of entry to multiple sites of expertise, clinical facilities and patient cohorts (Case Study 1).

Session 3: Making collaborative R&D work

In a complex ecosystem, organisations must be prepared to communicate and establish partnerships with multiple other bodies.

Dr Andy Richards, a serial biotech entrepreneur, described pharmaceutical innovation as a complex ecosystem. A technology may pass through multiple partners, each adding value along the way. Partnerships and collaborations are essential to the health of this ecosystem. The UK, he suggested, is very strong in this area, and could do more to communicate its successes.

Early-stage financing is often highlighted as an issue in translational research, particularly for biotech companies. Investment is there, he suggested, but not highly visible, and is typically highly focused and exit-oriented.

From the university perspective, **Dr Christine Martin**, Technology Manager at Cambridge Enterprise, acknowledged that university technology is often seen as extremely high risk, due to factors such as the lack of validation data and uncertainty about potential markets. Academics also experience a tension between the needs to publish and to protect intellectual property.

Progressing a technology calls for dialogue and partnerships with multiple bodies, from funders' technology transfer arms to biotech and pharma. The development needs of each technology are likely to be unique and should be carefully assessed. Universities

need to be prepared to seek advice and to establish clear and carefully planned collaborative agreements.

A relatively new source of funds to accelerate translation is the Biomedical Catalyst, described by BIA Chief Executive **Steve Bates**. Run jointly by the Technology Strategy Board and the MRC, the £180m three-year fund supports feasibility, early-stage and late-stage work, and lead organisations can be in either small companies or academia.

Charities fund much medical research in the UK, and **Dr Richard Seabrook** from the Wellcome Trust outlined some of the contributions they can make. Charities have three roles, he suggests, as facilitators of collaboration, as catalysts and as active participants. The Wellcome Trust has a strong commitment to partnerships, working in collaboration with the UK Department of Health, Research Councils and the industrial sector.

Charities fund considerable discovery research, development of which faces the usual problems – a lack of early-stage venture capital investment and a reluctance of pharma to in-license without support of proof of concept in humans.

One factor that may have a significant influence on future interactions is the growing importance of health data. Innovative analysis of health data, and linkage to large-scale research-generated ('omics') data, will create new opportunities for cross-sector and interdisciplinary collaboration.

For more information about the conference organisers, visit the websites below:

ABPI
www.abpi.org.uk

BIA
www.bioindustry.org

NOCRI
www.nihr.ac.uk/infrastructure/Pages/nocri.aspx