



Research careers in the biomedical sciences: promoting mobility between academia and industry.

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The Academy of Medical Sciences

The Academy of Medical Sciences promotes advances in medical science and campaigns to ensure these are converted into healthcare benefits for society. Our Fellows are the UK's leading medical scientists from hospitals and general practice, academia, industry and the public service.

The Academy seeks to play a pivotal role in determining the future of medical science in the UK, and the benefits that society will enjoy in years to come. We champion the UK's strengths in medical science, promote careers and capacity building, encourage the implementation of new ideas and solutions – often through novel partnerships – and help to remove barriers to progress.

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Foreword

The Academy of Medical Sciences campaigns for the development, protection and promotion of careers for biomedical scientists and encourages good practice in training and development across industry and academia. In 2005 the Academy published 'The Freedom to Succeed' – a review of non-clinical research Fellowships in the biomedical sciences. During the course of that study, the Academy received evidence indicating that significant improvements could be made in the mobility of post-doctoral scientists between industry and academia.

I was asked to convene a working group of representatives from the Academy's Clinical and Non-clinical Careers Committees, together with members of the FORUM with industry, to examine these issues in more detail. We set about investigating current attitudes towards careers in industry and mobility between industry and academic sectors, including motivation, career expectations and job satisfaction. We considered several factors that might improve career mobility, particularly focussing on training and professional development.

After gathering and analysing a range of evidence, the working group considered it an appropriate point at which to share its conclusions and recommendations, based on the information learned so far. We present our findings in the form of this discussion paper, intended to open up debate and stimulate further input. We welcome comments on the issues raised in this paper, which can be E-mailed to forum@acmedsci.ac.uk.

I would like to take this opportunity to thank Dr Robin Fears, Dr Suzanne Candy and Jenny Steere for their considerable time and efforts in supporting the working group and helping to draft this paper. I also thank all those who provided evidence to the working group and comments on the draft document.

Ultimately, providing a wide range of career options for the UK's biomedical scientists and clinicians will strengthen our research base, ensuring that the UK remains an internationally competitive place for biomedical science-based industries. I hope that this paper focuses attention on this important issue and provides a more informed basis for further action.



Professor Barry Furr OBE FMedSci
Chairman of the Working Group

Summary

The UK's world-class position in medical science is underpinned by a first rate workforce. It is vital that the UK's biomedical training and career structures are attractive to the next generation of young researchers. A key ingredient for success is collaboration between academia and industry; it is this interface that fuels the process by which new scientific ideas are brought into clinical application. The mobility of researchers is an important part of this interface - exchanging skills, forging opportunities and promoting mutual awareness.

The Academy of Medical Sciences has long promoted relations between academia and industry through the work of its FORUM. A previous Academy report, '*The Freedom to Succeed*', identified considerable scope for improving mobility between the two sectors and promoting the place of industry as an attractive career destination.¹ To explore this further, a small working group was convened to look more closely at perceptions towards careers in industry and to identify opportunities for promoting greater mobility (working group membership is given in Annex I). Evidence was sought from a range of academics, learned societies, public sector organisations, commercial companies and young scientists and researchers (see Annex II).

It is clear that career decisions are complex and that many factors influence individual preferences - job security, salary, work-life balance, autonomy, bureaucratic structures, and, for clinicians in particular, opportunities to maintain and upgrade professional skills. Evidence gathered during the course of this study confirmed that improvements could be made in researchers' awareness and understanding of career opportunities across the sectors, particularly amongst academics who might consider careers in industry. This is fuelled by a number of factors, including:

- An apparent information gap between the two sectors and a lack of communication about the intellectual challenges of industrial research.
- The strong commitment of academic researchers to university careers.
- A concern that moving into industry might lead to a loss of contact with academic networks and a reduction in autonomy.

At the same time, industry researchers testify to the challenging and rewarding nature of their work. Similarly, academics have a high regard for industry R&D and for academic-industry collaboration. Nevertheless, significant improvements could be made in the take up of schemes offering industry-based Fellowships and placements. A broad strategy is needed to foster greater awareness about the opportunities that careers in both industry and academia can provide and to increase mobility between the two sectors.

The working group's conclusions and recommended strategies are focused in four key areas:

¹ Academy of Medical Sciences (2005). *The freedom to succeed – A Review of Non-Clinical Research Fellowships in the Biomedical Sciences*.
<http://www.acmedsci.ac.uk/images/publication/AcdMedSc.pdf>

1. Fostering interactions between academia and industry

- Links must be forged between academia and industry to build a stronger collaborative culture, to foster greater interaction and to improve mobility between the sectors.
- Existing schemes for short-term exchange of students and researchers should be continued and monitored. Funders should be encouraged to create an information base of all schemes through a coherent system of information sharing.
- Schemes should be created to allow clinical academics to gain industry experience. The constituencies responsible for medical training, together with the National Institute of Health Research, industry and research funders, should develop a programme of options to provide opportunities for industrial secondments during both the training and mid-career stages of clinical careers.
- The new Department for Innovation, Universities and Skills and other stakeholders should look to provide students and postgraduates with increased exposure to industrial expertise and insights into industry research and working environments; scientists from this sector should be encouraged to contribute to teaching in higher education. We also recommend increasing the involvement of younger industry scientists in teaching.
- New opportunities should be created for young clinical academics to gain industry experience, for example incorporating a secondment to industry during their training years. Opportunities also need to be created for academic researchers in mid career; there is merit in considering the expansion of the GSK rotational scheme.

2. Promoting flexibility in career options

- Greater flexibility should be instilled in career options at all stages of the biomedical career pathway; researchers need assurance that moving between sectors represents a positive career choice.
- Opportunities to support researchers moving from industry to academia should be enhanced. HEIs, industry and research funders should collectively consider developing 'set-up packages' for mid-career and senior research staff moving from industry to academia. A similar approach could be applied to younger research staff.
- Academia, industry and UK research funders should develop indicators of success and professional development that are transferable across sectors. We recommend that Government modifies its Public Service Agreement (PSA) metrics appropriately to ensure the relevance of indicators to industry requirements and achievements.
- Mechanisms of clinical revalidation must be viable for physicians working in the pharmaceutical industry; maintaining clinical registration is vital to physicians' role in industry and in allowing them to return to clinical practice if they so wish. A committee to monitor the process of revalidation, comprised of the relevant constituencies, should be convened.
- Support should be available for researchers wishing to gain industrial experience. Mentoring schemes that afford the opportunity for mentorship from both academia

and industry should be explored for both non-clinical and clinical academics aspiring to gain industrial experience. We propose that the Academy takes account of industry needs in creating an outreach programme of mentorship training for junior clinical academics. Similar schemes should be created for non-clinicians. Devolved Administrations/RDAs might consider providing funding as support for their regional objectives.

3. Raising awareness

- Raising awareness of potential career paths within industry is essential.
- Industry should do more to address weaknesses in communication throughout the education system. Examples of good practice need to be disseminated and implemented more widely. We endorse the recommendations made in the ABPI skills report and recommend that the ABPI publish an interim review to follow up their proposals. We also urge that the recommendations of the BIGT report are assessed for their impact on skills and training.
- We recommend that universities introduce 'industry days' and companies extend their provision of open days. Opportunities for consolidating such interactions at the regional level should be explored with the Devolved Administrations and RDAs; funding might be available via the Knowledge Transfer Partnership strategic initiative operated by the former Department for Trade & Industry.

4. Gaining a greater understanding of the UK biomedical research workforce profile

- A greater understanding of the biomedical research workforce profile within the UK is needed.
- Data on workforce numbers should be collected and collated and made available, to allow a more strategic appraisal of mobility between sectors.

These strategies are explored in more detail in Section 5.

1. Introduction

The Academy of Medical Sciences supports high quality biomedical research across academia and industry. Both sectors contribute to UK R&D, bringing significant economic benefits and improvements to the nation's health. However, they should not be seen as separate enterprises. In medical research, collaboration between academia and industry is a vital aspect of the translational process, by which new ideas and findings in science are applied for patient benefit.

Medical researchers - whether basic biomedical scientists or clinicians - typically begin their advanced training in university settings, as PhD students or post-doctoral workers. A proportion of these researchers will then move on to industrial appointments, with some later moving back into the public sector, mostly to higher education institutions. Maintaining this mobility is important for the future of UK health research, and for securing the pharmaceutical industry's contribution to medical innovation and to the UK economy more broadly. This paper focuses on the pharmaceutical sector and does not specifically consider other sectors such as medical devices. However, some of the issues discussed will have broader relevance.

The pharmaceutical sector is research intensive, accounting for a quarter of UK business investment in R&D. As the recent Cooksey report noted, *'the private sector and, in particular, the pharmaceutical industry, is the largest single investor in health research in the UK'*.² The frameworks for innovation in health services and the climate for

development of new drugs are changing rapidly. One consequence, as noted in a previous Academy report *'Medical research: assessing the benefits for society'*, is a closer alignment between the goals of the public and private sectors.³ The Academy has been active in identifying the strategic needs for UK biomedical research in terms of both the requirements for infrastructure and skills and the opportunities for partnerships across the public and private sectors.⁴

In response to efforts by the Academy and others, there have been significant developments in establishing a more collaborative culture for UK biomedical research, in particular the inception of the UK Clinical Research Collaboration (UKCRC), the Clinical Research Networks and the establishment of the Office for the Strategic Coordination of Health Research (OSCHR). The opportunities for industry involvement in shaping the UK biomedical research agenda have never been greater.

The movement of highly qualified people between the public and private sectors has an importance beyond fulfilling the needs of companies for skilled employees. It also underpins mutual awareness in universities and industry of each other's needs, organisational pressures, constraints, working practices and operating environments. Furthermore, it helps to foster the joint

² Cooksey D (2006). A review of UK health research funding. HMSO, London.

³ Academy of Medical Sciences, Medical Research Council, Wellcome Trust (2006). *Medical research: assessing the benefits to society*. <http://www.acmedsci.ac.uk/images/publication/Medicalr.pdf>

⁴ Academy of Medical Sciences (2003). *Strengthening clinical research*. <http://www.acmedsci.ac.uk/images/publication/pscr.pdf>

working that is essential for successful translation, as set out in the Cooksey Report and the Department of Health's strategy '*Best Research for Best Health*'.⁵

In this paper we summarise recent reports on industry skills needs (section 2), before analysing the evidence received on views of working in industry (section 3). We then examine some of the existing funding opportunities that are available, including examples of particularly innovative schemes (section 4). Finally, we discuss potential strategies and make recommendations for improvement (section 5).

⁵ Research and Development Directorate, Department of Health (2006). *Best Research for Best Health. A new national health research strategy.*
http://www.dh.gov.uk/prod_consum_dh/idcplg?IdcService=GET_FILE&dID=23849&Renderit on=Web

2. Industry skills needs

A succession of recent inquiries has raised concerns about the supply of the skills needed by UK pharmaceutical and biotechnology companies. A report from the Pharmaceutical Industry Competitiveness Task Force noted that difficulties in satisfying specialist skill requirements are worsened by problems in recruiting graduates and postgraduates with the right mix of transferable skills, for example, in communication, problem-solving and time management.⁶ The Roberts review proposed remedies to address this weakness in generic skills in response to the evidence from across industry, including the pharmaceutical sector.⁷ The report of the House of Commons Trade and Industry Committee inquiry on the biotechnology industry reiterated the need to improve management training for smaller companies.⁸ The report from the Biosciences and Innovation Growth Team (BIGT) broadly appraised the management and scientific skills needed by smaller bioscience companies.⁹ The BIGT recommendations emphasised the importance of interdisciplinary doctoral training,

flexible delivery of business education, continuing vocational training for industry employees and outreach to schools and science centres to communicate the importance of bioscience innovation.¹⁰

Most recently, a report from the Association of British Pharmaceutical Industries (ABPI) highlighted the need for systematic engagement between industry and the education sector to improve the supply of skilled scientists.¹¹ Its survey of pharmaceutical companies identified current skill shortages predominantly in the *in vivo* science disciplines (e.g. physiology, pharmacology and clinical pharmacology, toxicology and pathology) and chemistry. Other work by the Academy of Medical Sciences' FORUM with industry has explored some of the specific skill deficits:

- The 2005 report '*Safer Medicines*' discussed current gaps and future needs across the disciplines required to support pre-clinical, clinical and post-marketing assessment of safety and drug metabolism.¹²
- A 2006 symposium on '*Drug Discovery*' raised the possibility that the current shortage of medicinal chemists in industry might be heightened - in the short term - by efforts on the part of the Medical

⁶ Pharmaceutical Industry Competitiveness Task Force (2001). *Final Report*. <http://www.advisorybodies.doh.gov.uk/pictf/pictf.pdf>

⁷ Roberts G. (2002) *SET for success: The supply of people with science, technology, engineering and mathematics skills*. http://www.hm-treasury.gov.uk/documents/enterprise_and_productivity/research_and_enterprise/ent_res_roberts.cfm

⁸ House of Commons Trade and Industry Committee (2003). *UK Biotechnology Industry*. http://www.bioindustry.org/bigtreport/downloadads/exec_summary.pdf

⁹ Biosciences and Innovation Growth Team (2003). *Bioscience 2015: Improving National Health, Increasing National Wealth*. http://www.bioindustry.org/bigtreport/downloadads/exec_summary.pdf

¹⁰ One specific BIGT recommendation was to increase the supply of MB PhD graduates in the UK. This issue was addressed by the Academy of Medical Sciences' MB PhD Working Group (<http://www.acmedsci.ac.uk/p111.html>).

¹¹ ABPI (2005). *Sustaining the Skills Pipeline in the pharmaceutical and biopharmaceutical industries*. <http://www.abpi.org.uk/publications/pdfs/2005-STEM-Ed-Skills-TF-Report.pdf>

¹² Academy of Medical Sciences (2005). *Safer Medicines*. <http://www.acmedsci.ac.uk/p102.html>

Research Council (MRC), Wellcome Trust and Cancer Research UK to build drug discovery teams in the public sector.¹³ However, it was noted that other efforts should increase overall capacity in medicinal chemistry, for example Cancer Research UK's Medicinal Chemistry Training Programme.

- In 2006, a symposium on 'Experimental Medicine' identified skills needs for translational research across the public and private sectors and made recommendations to build partnerships to capitalise on complementary strengths.¹⁴

This latter point was recently emphasised in the Cooksey report, which called for a skills strategy embracing private and public research to underpin the complex processes of translating research into health and economic benefits.¹⁵ The report emphasised the importance of identifying and addressing skills gaps in the drug development pipeline, including '*considering the potential for matched private/public funding where appropriate*'.

Some companies who contributed to the ABPI report observed that, when recruiting, they were faced with negative perceptions of careers in the pharmaceutical sector.¹⁶ These perceptions were echoed by some of the

academic scientists who were surveyed for the Academy's report '*The Freedom to Succeed*'.¹⁷ The Academy report found that '*many fellows have little contact with industry, and most do not consider this as a career route*'. More worryingly, views expressed in focus groups held during the course of that study revealed that moving from an academic-based fellowship to a position in industry is seen by some as a '*career failure*'. Further analysis of how the academic and industry sectors regard one another was provided in the recent Academy FORUM lecture given by Dame Nancy Rothwell FRS FMedSci, who observed that many academics assume that the research culture in industry is highly constrained and that research directions are changed frequently; they believe that a move to industry often entails a loss of the freedom enjoyed in academia, with little opportunity to explore less obvious research avenues.¹⁸ Views of working in industry are explored further in section 3.

¹³ Academy of Medical Sciences (2006). *Drug discovery symposium summary*. <http://www.acmedsci.ac.uk/p50evid61.html>

¹⁴ Academy of Medical Sciences (2006). *Experimental medicine symposium summary*. <http://www.acmedsci.ac.uk/p50evid50.html>

¹⁵ Cooksey D (2006). A review of UK health research funding. HMSO, London.

¹⁶ ABPI (2005). *Sustaining the Skills Pipeline in the pharmaceutical and biopharmaceutical industries*. <http://www.abpi.org.uk/publications/pdfs/2005-STEM-Ed-Skills-TF-Report.pdf>

¹⁷ Academy of Medical Sciences (2005). *The freedom to succeed – A Review of Non-Clinical Research Fellowships in the Biomedical Sciences*. <http://www.acmedsci.ac.uk/images/publication/AcdMedSc.pdf>

¹⁸ <http://www.acmedsci.ac.uk/p50evid66.html>

3. Views of working in industry – a summary of evidence

The working group received evidence from a range of academics, learned societies, public sector organisations, commercial companies and young scientists and researchers. Their responses covered a variety of aspects of career choice, including motivation, expectations, job satisfaction and peer influence. The picture that emerges is complex: career choices are influenced by multiple factors and it is difficult to disentangle perceptions – possibly ill-informed – from the genuine pros and cons of working in either academia or industry.

Industry scientists attest to the intellectual challenges and rewards of their work. Dr Patrick Vallance FMedSci, who recently left the post of Professor of Clinical Pharmacology at University College London to become Senior Vice-President for drug discovery at GlaxoSmithKline, put it thus: *'I probably spend more time thinking and talking about science now than I did in academia. Disease states, pathways, cell types . . . every day I'm faced with major scientific issues across a range of areas'*.¹⁹ Many respondents emphasised that industry offers the opportunity to do well-funded, cutting edge research that addresses worldwide public health needs. In one researcher's view, *'Often the work is more obviously going to have a direct impact on people's lives, particularly in drug development'*.

Yet a perception persists amongst a minority of academics that a career in industry represents a less intellectually rigorous option, or somehow means accepting 'second best'. There certainly

appears to be an information gulf at present. As one industrial research leader from a large pharmaceutical company put it, *'I have found it difficult to recruit high quality academics who have any idea what the purpose and scientific challenges of industry actually are'*.

It is clear that there are complex trade-offs in career choices, but researchers with experience of only the academic or industrial sectors may not see these accurately. An academic-industrial divide might be perpetuated by people on one side only seeing the negative aspects of working on the other. In one respect, this suspicion is reinforced by a lack of information about careers in industry among young academic researchers.

3.1 Career paths and financial incentives

Industrial companies can offer diverse career pathways, with the opportunity to influence, shape or even drive corporate policy. For example, researchers might move from the bench into medical or regulatory affairs. These varied paths are not, however, obvious to many of those working outside industry and this is an area where more information and transparency would be beneficial. In contrast, academia can offer a very clear, if somewhat linear, career progression, though competition for posts increases with seniority. There is a further feeling that working in industry can bring drawbacks in the form of increased bureaucracy, the slow pace of decision-making and the uncertainty that arises from frequent corporate reorganisation.

¹⁹ Watts G (2007). Working within industry's silken but firm embrace. *BMJ*, **334**, 871.

The salary and benefits available in industry are clearly attractive to younger researchers. Respondents noted that industry provides clearly defined training and development programmes and the potential for more rapid career progression than in academia. For clinicians, however, the financial benefits of working in industry were not so clear. Since consultants' contracts were revised in 2003, salaries are likely to be at least as competitive in the NHS.

Job security in larger companies was considered a positive factor by many non-clinical scientists. This could be especially important during early career stages, where industry offers more stability than the short-term contracts available in academia. However, clinicians noted that historically, job security in industry has been less than in the NHS. It was clearly recognised that - the possibility of corporate mergers aside - job security is much greater in large pharmaceutical companies than in smaller biotechnology companies. On the other hand, respondents noted that a smaller company might offer a greater variety of roles, for example in mixing bench research with strategic decision-making. Incentives such as company shares are seen to be good motivators, as is the possibility that individual researchers might have greater scope to influence the success of the company as a whole. Some researchers are attracted by the fact that smaller companies operate more like academic departments in terms of flexibility and dynamics.

Interestingly, there was disagreement over the relative flexibility of industry and academic work in relation to maternity leave and raising a family. Respondents acknowledged that the need for work/life balance is clearly

recognised in industry, and they viewed taking maternity leave as less detrimental to an industry career. However, academia was considered to offer more flexible working hours and increased opportunities to work from home. This was expressed by one respondent who noted that '*in academia it is easier to bring home work for days when a child is ill*'. One female researcher reported that she had recently considered going into industry, but was discouraged by the lack of childcare facilities. On the other hand, it was noted that academia is very demanding of time, often calling for long hours and weekend working.

3.2 Publications and recognition of work

Some scientists in industry reported their relief at being spared the continual need to apply for funding and maintain a strong publication record, while at the same time having to balance teaching or clinical responsibilities with their research. There were conflicting views about the importance of publication. For those who wanted to keep the option of moving from industry back to academia, the difficulty of publishing extensively from a company laboratory was a worry. Since publication does not tend to be a primary measure of achievement in industry, it may receive less emphasis. For some, however, this was a positive factor; one young researcher specifically cited the positive aspects of avoiding the '*publish or die*' culture typical of academia.

Some industry researchers reported their frustration at the difficulty of raising their profile, including being prevented from publicising their research on account of intellectual property

considerations. However, others noted that publication was rarely prohibited completely, but more often delayed while robust intellectual property protection is secured. Indeed, several examples were cited where industry managers have positively encouraged scientists to publish.

Publication of results and the opportunity to give presentations at intentional meetings are clear routes to peer esteem. Conference presentations and seminars also yield useful feedback. The necessary secrecy of industry work can reduce such opportunities, limiting wider recognition of individual achievements outside the company. Some clinicians working in industry felt that their work was not properly understood by NHS colleagues or recognised by industry colleagues in non-research roles. Although many industry scientists do publish, there it is still important work to do in encouraging more companies to reward their employees for publishing and for engaging in other scholarly activities and public service (e.g. serving on public committees). These activities are valued by industry employees, are likely to attract new collaborations and can influence the national research agenda. There was a strong feeling that more companies need to understand that such work need not distract from core business, and can be managed without compromising company confidentiality.

3.3 Quality of research

The breadth of work in industry and the opportunities to work on a variety of projects, in multidisciplinary teams, were recognised by several respondents. However, it was acknowledged that this

variety can often stem from the closure of projects and reassignment of resources and targets. This uncertainty and implied lack of personal control was a concern to some. However, others noted that the criteria for research success are well defined within industry, and it is unlikely that a decision to close a particular project would be sudden or surprising.

Some respondents felt that academic research is preferable because it allows individual researchers the freedom to direct their own work and to conduct 'blue skies' research. However, it was recognised that this freedom is constrained by funding and the nature of projects that grant-awarding bodies are willing to support.

Finally, several respondents felt their industrial experience had broadened their approach to teamwork and organisation, and also their approach to biological problems. As one senior researcher put it, *'it was only when I moved into industry that I realised how little I understood about how one takes an idea, develops a potential candidate drug and progresses it into studies in humans to test if an approach has the potential to be a new medicine. My interest in a number of areas was reignited and I recognised that developing a good understanding of cellular and in vivo pharmacology not only supported pharma R&D, but changed the way I thought about many aspects of biology'*.

3.4 The image of industry

Some of the evidence received expressed concerns about the sometimes negative public image of

pharmaceutical companies and the ethics of industry research. This was recognised by one industry researcher, *'within the medical profession you often feel isolated - that you have sold out to the 'dark side'.*

Although the role of industry in improving patients' quality of life was clearly recognised, the fact that research agendas were subject to the profit motive was a concern for some. High profile press stories publicising questionable behaviour on the part of some companies are clearly detrimental to the industry as a whole, and could affect recruitment.

The company sales force often plays a major role in shaping the impression of industry amongst academics; there is an apparent disconnect between marketing and scientific activities. As one clinical lecturer put it, *'much of my bias I suppose comes from meeting drug reps and company reps which I know are not reflective of the industry's scientific community. But they do give an impression, and I am not sure I want to join that sort of team.'*

There is definite scope for all company representatives to become more familiar with the nature of academic research and the similarities and differences with research carried out in industry; representatives could act as an important conduit for disseminating opportunities for research positions in industry and fostering potential collaborations. Furthermore, academic-industry collaborations represent an important opportunity to build positive public relations through communicating messages about shared principles, practices and value of research across both sectors.

3.5 Information about industry

Many respondents reported difficulty in getting information about the realities of working in industry and the career opportunities it affords. As one industry observer noted, *'I received no support from school or university regarding my chosen subjects or future career - there are real gaps in capability and 'intelligence' within both schools and university career departments'.*

Often, what researchers in academia know about working in industry depends solely on personal contacts and friends in the private sector. One head of an academic department said she *'would like to be in a position to give reliable information about careers in industry to young researchers but I do not feel I have all the necessary information'.* Similarly, the Medical Schools Council reported that none of the post-doctoral researchers they asked felt well informed about career routes in industry.

3.6 A one-way street?

Most respondents felt it was possible to move from academia into industry, but much harder to move back. The flexibility of the path between academia and industry - in either direction - was also felt to decrease with ascent up the career ladder; a move from industry to academia might be possible a year or two after joining industry, or much later, but it would be especially difficult to return in mid-career. One respondent described industry vacancies as *'too specific in the requirements, focusing on industry-related experiences, which may deter academically trained scientists'.*

Both sectors stand to benefit from a wider exchange of expertise, though there are several challenges to overcome. For instance, job applications in universities, and submissions for research funding, depend heavily on publication record. Writing papers is possible in industry and publication of results is now much more encouraged than it has been in the past (see 3.2). Several respondents felt that an assessment system that includes indicators of research excellence other than publication would be helpful.

It is important not to over-generalise and to avoid sustaining stereotypes that may be outdated. There is evidence in both the UK and USA of recent successful efforts by major pharmaceutical companies to recruit from academia into senior R&D positions. It is also important to emphasise that increased mobility to and from industry is not only attractive to academia: there are also valuable opportunities for secondments between industry and the civil service.

3.7 Barriers for clinical scientists

The evidence received indicated that clinical scientists appear to have fewer incentives to consider working in industry. While non-clinical researchers may find the salary prospects better outside academia, the differential is considerably reduced for those on clinical pay scales, especially at senior levels. Clinical scientists also have the option of combining university-based research with working in the NHS. Clinicians who move to industry posts may find it difficult to find time to offer clinical sessions. In addition, the requirement for revalidation for doctors in the UK

may make it more difficult to return to a clinical role from an industrial job that lacked any clinical responsibility. Some felt that, in this respect, the position is better in the US, but one respondent from a US pharmaceutical company indicated that *'there is no obvious route back into academic medicine in either the UK or US'*.

The exception to this difficulty may be clinical pharmacology, where academic career prospects may be enhanced by a position in industry, and more joint posts exist. More broadly, the view that a move from industry back to academic work is problematic was not unanimous. One respondent saw signs of recent change: *'From my perspective I believe the path is becoming more flexible - in so much that it might be possible to return to academia on the basis of industrial and not academic experience and to not be penalized for having been in industry. I believe academia is beginning to understand the benefits of industrial experience.'*

4. Funding opportunities

4.1 Views of funders

There was a general message from research funders that they wish to support joint work between academia and industry; most funders run a variety of schemes to encourage such collaboration. Funders acknowledge that research training needs to incorporate opportunities to develop business skills and commercial awareness. Much of the activity organised in this area is aimed at developing entrepreneurial awareness and is geared to commercialisation of academic work, perhaps by personal involvement in a new commercial venture. There is less focus on initiatives aimed at increasing awareness of career possibilities within existing commercial companies – although the two are not, of course, mutually exclusive.

4.1.1 *Medical Research Council (MRC)*

The MRC considers training of skilled researchers to meet the needs of academia, industry and the NHS to be an important part of its remit. It encourages its own staff to work with industry on programmes of mutual interest, and there is industrial representation on the MRC Council, boards and panels (although the MRC has reported difficulties in recruiting industrial members).

At PhD level, the MRC's Doctoral Training Accounts allow for universities and MRC institutes to support collaborative studentships with industrial partners. The MRC has indicated, however, that the range of permitted flexibility is not being fully exploited. At a more senior level, the MRC's Fellowship Schemes provide opportunities for those who wish

to spend time in an industrial centre. As with other attachments at a second centre, the aim is to provide training that cannot be provided so effectively at the host institution. Again, the MRC notes that very few applicants seek to work in an industrial setting. It has been suggested that this might be due to a lack of awareness of this option, a paucity of contact with industry, poor knowledge of research conducted in industry, or because the kind of research that Fellows undertake is not generally conducive to forming such links. It was also observed that industry had distanced itself somewhat from academic research and internalised its training over the last 20 years.

It should be noted that the MRC is currently reviewing its training priorities, and considering how to respond to a perceived decline in the number of pharmaceutical industry-university collaborations.

4.1.2 *Biotechnology and Biological Sciences Research Council (BBSRC)*

BBSRC research training is in many respects well linked with industry at the doctoral stage, with almost one third of the 1500 or so PhD studentships the Council awards each year made under the Cooperative Awards in Science and Engineering (CASE) scheme. This involves an industrial collaboration and a placement with a company for 6-18 months. After completion of their PhDs, 24% of students funded by the BBSRC in 2002-2005 moved into their first job in industrial or commercial organisations, with 35% starting jobs in universities.

Other targeted funding schemes include the Research Councils Business Plan

Competition, Knowledge Transfer Partnerships, an Industry Interchange Programme, Enterprise Fellowships (supporting researchers who want to be directly involved in commercialising their own work) and Industrial Partnership Awards for responsive mode grants. The Council's David Phillips Fellowship Scheme, which supports outstanding researchers in their first position as Principal Investigators, welcomes applicants from industry and proposals for joint funding arrangements. BBSRC is considering developing a separate CASE Fellowship scheme to support further development of joint working at this level.

4.1.3 Cancer Research UK (CRUK)

CRUK does not at present fund any industrial fellowships, but recognises that this type of training can be extremely valuable, particularly in certain disciplines. The organisation's general clinical and non-clinical fellowship schemes offer the possibility of placements in industry, with the agreement of the fellow's host institution, but there were no current examples of this.

Some CRUK-funded researchers have specific links with industrial partners. The Paterson Institute for Cancer Research has recently established a local scheme to support two clinical pharmacology research fellowships, jointly funded by CRUK and AstraZeneca. These are 3-year awards, and the fellows will receive training in translational research and Phase I clinical trials from academic, clinical and industry perspectives.

CRUK has also recently established training programmes at PhD level in medicinal chemistry, several of which

have links with industrial partners. One example is the programme at the Department of Chemistry at Imperial College, London, which includes a three-month placement at AstraZeneca, in the third year of a four-year PhD.

4.1.4 The Royal Society

In addition to its role in supporting development and maintenance of excellence in the UK's science base, the Royal Society operates a number of schemes specifically aimed at increasing interaction between industry and academia. These include the Industry Fellowships Scheme, awards for innovation, an annual 'Labs to Riches' event at which scientists funded by the Society talk about their experience of commercialisation, and a business programme for Research Fellows run in partnership with a leading business school. The Royal Society observed that, while most of the scientists it supports are committed to research in the public sector, a growing number recognise the benefits of collaborating with industry.

4.1.5 The Wellcome Trust

The Wellcome Trust recognises the need for strong links between universities, hospitals and industry as a prerequisite for successful translation of research. Specific Trust schemes relevant to this aim include Translation Awards, which support partnerships between researchers and technology transfer professionals working on early stage innovations, and the Seeding Drug Discovery Initiative. The latter involves university research groups, together with commercial providers and consultants involved in research into small molecules, which may offer promise for drug development in areas of unmet medical need.

The Trust does not provide studentships or fellowships specifically aimed at those seeking industrial experience. However, its support for infrastructure for clinical research, such as the Wellcome Trust Clinical Research Facilities, includes centres that bring together researchers from different sectors. The Drug Discovery Unit at the University of Dundee, for example, aims to incorporate best drug industry practice in a university-based research unit.

4.2 Examples of innovative schemes

4.2.1 Industry Fellowships

The Industry Fellowships Scheme allows academics to work in industry on projects ranging from basic science to industrial innovation, or for industrial scientists to undertake research or course development in universities. The scheme is funded by the BBSRC, Royal Society, Engineering and Physical Sciences Research Council, Natural Environment Research Council, Rolls-Royce plc and Astra Zeneca. It is administered by the Royal Society, and recent evaluation indicates that fellows found their experience had given them greater insight and understanding of the sector they had spent time in.

4.2.2 Integrative Mammalian Biology Initiative

As well as general fellowship schemes and awards, public research funders can form partnerships with industry to build up strategically important areas. For example, the Integrative Mammalian Biology Initiative is designed to build capacity in the study of how gene products integrate into the function of whole tissues in complex organisms. It is backed by £11m, incorporating £4m

from HEFCE, £1m from SHEFC, £2m each from BBSRC and MRC, and a further £2m from the British Pharmacology Society's Integrative Pharmacology Fund, furnished by AstraZeneca, GlaxoSmithKline and Pfizer. Other funders such as CRUK contributed to this initiative in the form of PhD studentships. Four Higher Education Institutes (HEIs) received awards, all of which included a significant training element.

4.2.3 Research Careers Mapping Tool

The Research Councils UK Careers and Diversity Unit is currently in the late stages of developing a Research Careers Mapping Tool. This web-based portal will provide information for PhD students and post-doctoral scientists on the range of research careers they might follow in academia, research institutes and industry. The pilot version will focus on biomedical research.

4.2.4 Biotechnology Young Entrepreneurs Scheme (YES)

This scheme has been run by the BBSRC since 1995 and involves teams of postgraduate students or post-doctoral scientists assuming roles in an imaginary biotech start-up company, including drawing up a business plan. The plans are judged by experienced figures from industry. Although the competition is framed in terms of starting a company, research indicates that the exercise, and the contacts it brings, stimulates 'a realisation that there is a multitude of career opportunities for those who seek a move out of the academic environment'.²⁰

²⁰http://www.biotechnologyyes.co.uk/success_stories.html

5. The way forward

Evidence gathered during this study has confirmed that promoting greater understanding between the sectors and improving mobility between the respective workforces would bring a range of advantages.

It should be emphasised that there is more mobility between academia and industry - even in senior positions - than is often assumed. However, there is a continuing need to tackle negative perceptions where they exist and to build a more collaborative culture. This requires improved communication about industry research principles and practices and facilitating more exchange between the sectors.

5.1 Fostering interactions between academia and industry

Providing opportunities for short-term exchange of students and research staff is one route to promoting interactions across the academic and industry sectors. A key task is to ensure that existing schemes (summarised in section 4) are used to maximum benefit. This will involve a renewed commitment from both academic funders and industry to increase opportunities for contact and interaction. But there is also scope to create new schemes targeted at distinct career stages where opportunities are currently lacking.

5.1.1 Early career support – Masters qualifications and Fellowships

Respondents observed that early contact between students and companies tends to generate a bigger impact; many can testify to the personal value of sandwich (undergraduate) and CASE Award (PhD) courses. We welcome the proposal by

the ABPI to target CASE Awards to strategic areas and to use 'doctoral training accounts' to support PhD and MSc studentships of relevance to industry.²¹ The Cooksey Report also recommended that OSCHR's Translational Medicine Board should work with HEIs and industry to pilot new qualifications that expose students to research, such as a Masters in Research.²² The aim would be to boost specialist skills in areas such as informatics, clinical pharmacology, biostatistics, quantitative methods, knowledge transfer and entrepreneurship. We support this recommendation and its potential to strengthen the UK's skills-base through exposure to industry.

For some early/mid career researchers, salary and research support is provided by fellowships, which focus on career development as well as scientific endeavour. Many existing fellowship schemes make provision for industrial participation. A brief summary of non-clinical and clinical fellowships is given below.

Non-Clinical Fellowships

The Academy's report 'The freedom to succeed' made several proposals to improve the flow of non-clinical fellows into industry, including:²³

²¹ ABPI (2005). *Sustaining the Skills Pipeline in the pharmaceutical and biopharmaceutical industries*. <http://www.abpi.org.uk/publications/pdfs/2005-STEM-Ed-Skills-TF-Report.pdf>

²² Cooksey D (2006). A review of UK health research funding. HMSO, London.

²³ Academy of Medical Sciences (2005). *The freedom to succeed – A Review of Non-Clinical Research Fellowships in the Biomedical Sciences*. <http://www.acmedsci.ac.uk/images/publication/AcdMedSc.pdf>

- Extending the success of CASE studentships by establishing similar industry/academia Fellowship schemes; this is now being actively considered by the BBSRC.
- Developing a new biomedical science Fellowship programme co-funded by Regional Development Agencies and/or research councils, to facilitate links between HEIs and regional industries.

Clinical Fellowships

There are some notable examples of successful clinical academic Fellowships that incorporate industrial participation. For instance, the 'ABPI Clinical Pharmacology' scheme has been running for ten years and has provided at least 25 Fellowships for clinicians in Specialist Registrar training. We recommend a significant expansion in such schemes.

Industrial experience could also be built into the new clinical academic training programmes created by the sub-committee of Modernising Medical Careers (MMC) and UKCRC. Clinical trainees with an interest in industry could be offered optional modules in pharmaceutical medicine within

companies. For example, trainees in the Academic Foundation year 2 (F2) could spend 3–4 months with a company. Initial indications are that industry would be open to such an initiative and could deliver 30 places for F2 trainees per annum.

Clinical academics at other career stages could also receive some of their research training in industry. For instance, at doctoral level, the research component of the MB PhD scheme could take place in a pharmaceutical company. Clinical Training Fellowships and postdoctoral Academic Clinical Fellowships could also be established within industry. Similarly, a proportion of the research time of a Clinical Lectureship or Clinician Scientist Fellowship could take place in an industry setting.

We welcome the continuation of the European Commission-funded Marie Curie fellowships but note that it is important for the operation of the scheme to be carefully monitored to ensure that it matches company expectations (see box below).

EU Marie Curie Fellowships

Under Framework Programme 5, pharmaceutical companies judged 'industry host' Marie Curie Fellowships to be highly effective in introducing young scientists to industry R&D facilities and practices. Approximately one-third of these fellows took up a permanent position within the host company after completion of their fellowship.

However, the 'industry host' scheme was dropped in Framework Programme 6 and it became more difficult for pharmaceutical companies to become involved in Marie Curie Fellowships. The recent initiation of Framework Programme 7 includes a stronger focus on training and career development for Marie Curie Fellows in the private sector, with an emphasis on smaller companies. Parts of this Programme that may be particularly attractive to industry are the 'Intra-European Fellowships' for experienced researchers with a doctorate and the 'Industry-Academic pathways and partnerships scheme' that might allow secondment of researchers from the private to the public sector.

Until the details of Framework Programme 7 are clarified and the operation of the new schemes can be monitored, it is difficult to assess the likely impact. The principle of supporting public-private sector researcher mobility is highly welcome, but it is important that the scheme offers the same opportunities to both larger and smaller companies.

5.1.2 Mid career support

Although data on the numbers of researchers moving between academia and industry are scarce, our findings suggest that movement is more limited at mid-career stages. Strategies to promote exchange at this level include the creation of opportunities for sabbaticals and research placements (see below).

Sabbaticals and short-term placements for academic-industry exchange

Encouraging short-term exchange of researchers can facilitate collaboration and promote awareness between sectors. To ensure success, industry and academia need to work together to ensure these opportunities are attractive.

Some companies are already offering such schemes, such as the Genentech Clinical Research Fellowship programme.²⁴ The programme offers one-year fellowships; fellows become members of the Clinical Development Group at Genentech and work closely with top institutions and physicians to develop novel therapeutics. Fellows are supported by mentors at both Genentech and their academic institution.

Other companies are considering such schemes, exemplified by GlaxoSmithKline's proposal for a 'Rotational Scheme for Clinicians'. This

scheme would be targeted at clinicians at early senior lecturer level who are interested in the discovery end of NHS R&D. The option of an open academic/NHS post following the industrial placement would also be available. Academic value would be ensured through senior level endorsement from funders, industry and medical schools. Appointees will need assurance that the industrial training can add value to their CVs through the development of new skills, and will be recognised as part of Continuing Professional Development (CPD).

Promoting a collaborative culture through teaching

Our evidence suggests that only a small and select group of senior industry scientists spend part of their working life in a university or hospital, where they provide teaching and clinical sessions alongside their industry commitments. However, this is seen to be immensely valuable and provides students and postgraduates with an insight into the research and working-environment within industry.

There is definite scope for encouraging more industry scientists to undertake short-term adjunct academic teaching appointments. This would help provide undergraduate and postgraduate courses with expertise in the specialist skills necessary for translational research, and could be especially useful for the proposed 'Masters in Research'.

²⁴<http://www.gene.com/gene/research/fellowship/index.jsp?hl=en&q=genentech&btnG=Google+Search&meta=>

Of course, the commitment to teach such courses would need to be balanced with the demands of fulfilling a role in industry. But there are examples of success: the recent initiative linking Pfizer and Brighton and Sussex Medical School, in which senior staff from the company taught pharmacology and therapeutics and delivered a specially developed module in Pharmaceutical Medicine, deserves closer attention.

The Lambert Review of Business-University Collaboration recommended that business people should be exempted from the standard requirements to undertake training to lecture in universities.²⁵ The initial government response to this recommendation noted that training arrangements should be proportionate and should encourage more business involvement in universities.²⁶ It is essential that industry is fully aware of quality assurance issues around higher education teaching; collaborative teaching projects where industrialists and academics jointly lead sessions and projects can often work best.

Organisations such as Learned Societies, Royal Colleges and the Academies have a role to play in advocacy. They could provide a point of coordination for academic and industry research staff wishing to inform and inspire students. For example, the Academy's FORUM with industry recently held a symposium to look at the complexity and demands of

²⁵ Lambert R. (2003). *Lambert Review of Business-University Collaboration*. http://www.hm-treasury.gov.uk/media/DDE/65/lambert_review_final_450.pdf

²⁶ HM Treasury (2004). *Science & innovation investment framework 2004 – 2014*. http://www.hm-treasury.gov.uk/media/95846/spend04_sciencedoc_1_090704.pdf

the drug discovery process, bringing together relevant sectors of the academic and industry research communities to share ideas and discuss latest research. There would be merit targeting this kind of symposium to a younger research audience, perhaps through a series of regional meetings tailored to particular disease areas.

Fostering interactions between academia and industry in summary:

- **Links must be forged between academia and industry to build a stronger collaborative culture, to foster greater interaction and to improve mobility between the sectors.**
- **Existing schemes for short-term exchange of students and researchers should be continued and monitored. Funders should be encouraged to create an information base of all schemes through a coherent system of information sharing.**
- **Schemes should be created to allow clinical academics to gain industry experience. The constituencies responsible for medical training - the National Institute of Health Research, industry and research funders - should develop a programme of options to provide opportunities for industrial secondments during both the training and mid-career stages of clinical careers.**
- **The new Department for Innovation, Skills and Universities and other stakeholders should look to**

provide students and postgraduates with increased exposure to industrial expertise and insights into industry research and working environments; industry scientists should be encouraged to contribute to teaching in Higher Education. We also recommend increasing the involvement of younger industry scientists in teaching.

- **New opportunities should be created for young clinical academics to gain industry experience, for example incorporating a secondment to industry during their training years. Opportunities also need to be created for academic researchers in mid career; there is merit in considering the expansion of the GSK rotational scheme.**

5.2 Promoting flexibility in career options

Providing flexibility in career options at all stages of the career pathway is pivotal to enhancing mobility. The discussion below addresses issues of: flexibility within industry; revalidation of pharmaceutical clinicians; promoting movement from academia into industry; indicators for success; and mentoring.

5.2.1 Flexibility of research careers in industry

The evidence received indicates that a research career in industry is generally regarded as offering less flexibility than many academics desire. This perception is heightened by the apparent variability between companies in terms of freedom

to develop and pursue individual research, publish scientific papers, attend scientific conferences or foster academic collaboration, and in mechanisms of acknowledging an individual's research contribution.

Whilst each company determines its own operational procedures and policies, industry as a whole should be encouraged to consider these issues. A cross-company working group might identify ways to maximise flexibility for researchers, such as encouraging them to publish where possible and promoting networking in the research community.

An important output of such a working group would be a strategy to communicate a more coherent picture of life in industry. Companies need to rethink the way they communicate their research to an academic audience, for instance through provision of information on company websites and links to current research projects. E-mailing current news or sending short newsletters to relevant academic departments would demonstrate companies' willingness to engage and collaborate.

5.2.2 Revalidation of Pharmaceutical Clinicians

A key issue for clinical academics considering a move to industry is the revalidation of clinical skills. Medical doctors need to maintain their General Medical Council (GMC) registration to enable them to authorise clinical trials and take part in the process of marketing authorisation applications for drugs. Maintaining clinical registration is also vital for those who may wish to return to clinical practice. There is broad agreement that the mechanisms of revalidation must be viable for

pharmaceutical industry physicians. The recent White Paper response to 'Good Doctors, Safer Patients' indicates that all practising doctors will need to revalidate to maintain the license to practice, including doctors in industry.²⁷ We support those urging that all pharmaceutical physicians be allowed to maintain their clinical skills, within a robust and appropriate system. The system should also consider those who wish to spend time abroad and how they can be re-integrated into the UK system, both academically and clinically.

5.2.3 Promoting two-way movement - developing opportunities for research staff to transfer from industry to academia

The number and variety of schemes on offer for academics considering a move to industry is encouraging, but there are fewer opportunities for people wishing to transfer from industry to academia.

One route to improvement might be to adopt an approach found in the US. During the appointment process for an incoming academic researcher, universities will negotiate a substantial hiring package as part of the deal. Such a package will usually include the refurbishment of office and laboratory space along with a budget for staffing, equipment and consumables for a particular period of time. In the UK, such hiring incentives are far less common, with relatively small start-up budgets offered to most academics upon appointment. UK HEIs should consider working with research councils and regional development agencies to

²⁷ Department of Health (2007). *Trust, Assurance and Safety - The Regulation of Health Professionals*.
http://www.dh.gov.uk/prod_consum_dh/idcplg?IdcService=GET_FILE&dID=122083&Revision=Web

develop attractive set-up packages for newly appointed academics. Such an approach could be used to smooth the path for senior scientists seeking to re-establish themselves within a university environment after a period in industry. It could also be extended to researchers at other levels, such as post-doctoral research staff and mid-career researchers.

5.2.4 Indicators of success

In the longer term, funders, industry and HEIs should consider defining indicators of success that are transferable across sectors. The competencies required in both academia and industry are comparable - generic and applied research skills, research governance, communication, training and education.

5.2.5 Mentoring

Mentoring has become widely accepted as valuable for academics, particularly at career transition points. Currently, a number of schemes operate for clinicians and clinical academics, including the Academy's Mentoring Scheme for Clinician Scientist Fellows. A dual mentoring approach could provide positive role models of clinical academics in industry who can provide support and advice in making the career move to industry. GlaxoSmithKline have already instituted such a scheme for clinicians undertaking a PhD.

Promoting flexibility in summary:

- **Greater flexibility should be instilled in career options at all stages of the biomedical career pathway; researchers need assurance that moving between sectors represents a positive career choice.**

- **Opportunities to support researchers moving from industry to academia should be enhanced. HEIs, industry and research funders should collectively consider developing 'set-up packages' for mid-career and senior research staff moving from industry to academia. A similar approach could be applied to younger research staff.**
- **Academia, industry and UK research funders should develop indicators of success and professional development that are transferable across sectors. We recommend that Government modifies its Public Service Agreement (PSA) metrics appropriately to ensure the relevance of indicators to industry requirements and achievements.**
- **Mechanisms of clinical revalidation must be viable for physicians working in the pharmaceutical industry; maintaining clinical registration is vital to physicians' role in industry and in allowing them to return to clinical practice. A committee to monitor the process of revalidation, comprised of the relevant constituencies, should be convened.**
- **Support should be available for researchers wishing to gain industrial experience. Mentoring schemes that afford the opportunity for mentorship from both academia and industry should be explored for both non-clinical and clinical academics**

aspiring to gain industrial experience. We propose that the Academy now takes account of industry needs in creating an outreach programme of mentorship training for junior clinical academics. Similar schemes should be created for non-clinicians. Devolved Administrations/RDAs might consider providing funding as support for their regional objectives.

5.3 Raising awareness

The lack of information on industry as a whole, as well as about potential career paths within the sector, must be addressed. Companies must work with HEIs, the NHS, funders and learned societies to raise the image and profile of industrial positions within the academic community.

In particular, we agree with the recommendations made in the ABPI skills report that the pharmaceutical sector must improve its communications about its expectations of practical skills for priority areas; encourage continued dialogue between employers and university departments to promote understanding of the needs of industry; improve liaison in both primary and secondary education; and work more proactively in specifying information on careers in science.²⁸

5.3.1 Communication

University Careers Offices indicate that general information on a career in

²⁸ ABPI (2005). *Sustaining the Skills Pipeline in the pharmaceutical and biopharmaceutical industries*. <http://www.abpi.org.uk/publications/pdfs/2005-STEM-Ed-Skills-TF-Report.pdf>

industry is 'patchy'. There appears to be no single resource covering the opportunities available across the sector, but rather pharmaceutical companies tend to direct people to their individual websites. A more coordinated approach would be beneficial. For instance, engineering and IT companies collectively provide more comprehensive general information on career pathways. Industry should consult University Careers Offices to develop more effective promotional material, as well as becoming more engaged at Open Days and road show events.

We are encouraged by recent initiatives such as the development of the RCUK-led web portal with its career mapping tool and look forward to its launch.

However, effective information and advice are crucially linked with personal contact and interaction. Career aspirations are more likely to be affected by personal experience and hearing others' experience directly. To accomplish this, more open dialogue is needed between industry and academia. A range of initiatives might be considered, including outreach to school students, interactions with young academics and industry workshops, such as the recent three day drug discovery workshop organised by AstraZeneca for 25 final year PhD students, aimed at giving them a realistic view of how industry science is conducted. Consideration should also be given to reviving student open days in companies. The previous generation of academics felt that visiting companies was beneficial and a number lament the loss of such opportunities.

HEIs, funders and learned societies should utilise their outreach mechanisms to promote information and

opportunities in industry. We note with interest the initiative by Stanford School of Medicine in the US in organising an annual Biotech Industry Career Day to provide a single point of contact for companies seeking to recruit or collaborate.²⁹ We suggest that HEIs consider introducing something similar in the UK on a regional basis.

Raising awareness in summary:

- **Raising awareness of potential career paths within industry is essential.**
- **Industry should do more to address weaknesses in communication throughout the education system. Examples of good practice need to be disseminated and implemented more widely. We endorse the recommendations made in the ABPI skills report and recommend that the ABPI publish an interim review to follow up their proposals. We also recommend that the recommendations of the BIGT report are assessed for their impact on skills and training.**
- **We recommend that universities introduce 'industry days' and companies extend their provision of open days. Opportunities for consolidating such interactions at the regional level should be explored with the Devolved Administrations and RDAs; funding might be available via the Knowledge Transfer Partnership strategic initiative operated by the former DTI.**

²⁹<http://med.stanford.edu/careercenter/bid07.html>

5.4 Gaining a greater understanding of the UK biomedical research workforce profile

We support recent recommendations to review and monitor the skill base within UK health research. The ABPI report recommended that Government should help to establish a UK *In Vivo* Sciences Task Force.³⁰ This work is being taken forward by the ABPI and Biosciences federation, with the support of the former DTI, facilitating discussions with relevant stakeholders and government agencies. A report and action plan is due to be released in October 2007.

Taking a wider view, we also endorse the recent Cooksey review recommendation to establish a working group to develop a strategy to ensure that the UK has the right mix of skills, experience and career structures across the whole spectrum of health research.³¹ We further recommend that data on workforce numbers be more comprehensively collected and collated, to inform a strategic appraisal of mobility between sectors.

Industry should share data on numbers of biomedical scientists and clinical academics applying and entering the sector, categorised by career stage and discipline. Funding agencies should collate statistics on number of applications and awards for industrial research studentships and fellowships. This aligns with the recommendation in the Academy report '*Freedom to Succeed*' to facilitate a meta-analysis for

the UK funding system as a whole. To complete the picture, HEIs and the NHS should monitor and record researchers moving from industry to academia.

These data would need overall collation and management, and funding should be sought to support a cross-sector personnel-monitoring programme. A longer-term aim would be to implement a 'Career Tracking Tool' that could follow individual academics between sectors and throughout their career pathway.

The results of such an exercise would allow both academia and industry to monitor academic researchers' movements and preferences. It would also provide academic researchers themselves with evidence of flexibility and choice in the career pathway. It is hoped that the combination of existing initiatives with the proposed strategies for short-term mobility presented here will give academics the assurance they need about the different career paths available to them.

Gaining a greater understanding of the UK biomedical research workforce profile in summary:

- **A greater understanding of the biomedical research workforce profile within the UK is needed.**
- **Data on workforce numbers should be collected and collated and made available, to allow a more strategic appraisal of mobility between sectors.**

³⁰ ABPI (2005). *Sustaining the Skills Pipeline in the pharmaceutical and biopharmaceutical industries*. <http://www.abpi.org.uk/publications/pdfs/2005-STEM-Ed-Skills-TF-Report.pdf>

³¹ Cooksey D (2006). A review of UK health research funding. HMSO, London.

Annex I: Working group membership

Working group

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Annex II: Respondents to the call for evidence

Organisations

Association of the British Pharmaceutical Industry
 BioIndustry Association
 Biotechnology and Biological Sciences Research Council
 Brighton and Sussex Medical School
 British Heart Foundation
 Faculty of Pharmaceutical Medicine
 GlaxoSmithKline
 Institute of Biomedical Science
 Institute of Food Research

Medical Research Council
 Medical Research Council Laboratory of Molecular Biology
 Medical Schools Council
 Royal College of Anaesthetists
 Royal College of Physicians
 Royal Society
 Wellcome Trust
 Wellcome-Trust Center for Cell-Matrix Research

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 President, Autonomic Neuroscience Centre, Royal Free and UCL Medical School
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 Robert Forrest, Consultant in Clinical Chemistry & Forensic Toxicology, Royal Hallamshire Hospital
 Andy Fowler
 Dr Andrew Garner, Lead Generation Group, Cancer & Infection Research Area, AstraZeneca
 Dr David Gillen, Medical Director, Wyeth UK
 Dr Fiona Girdler, Faculty of Life Sciences, University of Manchester
 Dr Vicki M Giuggio, Division of Immune Cell Biology, National Institute for Medical Research

Dr Jodie Guy, Post-Doctoral Researcher, Karolinska Institute, Sweden
 Dr Richard Henderson FRS, Director of MRC, Laboratory of Molecular Biology
 Lars J.C. Jeuken, BBSRC David Phillips Research Fellow, University of Leeds
 Dr Teresa Klinowska, Cancer Bioscience, AstraZeneca
 Dr Kirsty Line, Academic Post-Doctoral Research Fellow
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 Inke Näthke, Cancer Research UK Senior Research Fellow & Reader, University of Dundee
 Pat Price
 Dr Anthony G Quinn, VP & Head of Discovery Medicine, Roche Palo Alto
 Ruth Ross
 Professor Dame Nancy Rothwell FRS FMedSci, Vice President for Research, MRC Research Professor, University of Manchester
 Professor Sir John Tooke FMedSci, Dean, Peninsula Medical School

Victor Tybulewicz, Head of Division of Immune Cell Biology, National Institute for Medical Research, The Ridgeway, London, UK.

Dr Edward Wild, Clinical Research Fellow, Institute of Neurology
Sarah Wild, Research Technician, Manchester University

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