The Academy of Medical Sciences

The freedom to succeed: the careers and futures of biomedical scientists in UK academia

Report of a meeting organised by the Academy of Medical Sciences at the University of Bristol, 18 October 2007.

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.

Introduction

The Academy's report 'The Freedom to Succeed' published in 2005 reviewed a range of issues relating to the sustainability and fitness for purpose of Biomedical Research Fellowships. The report elicited positive responses from the academic and research funding communities and the Academy has continued to monitor the changes to the research support and training structures that are impacting on UK fellowships and on the early post-doctoral years more generally.

The Academy's work for the 2005 report included an extensive inquiry involving fellowship award holders, funding agencies and Higher Education Institutions (HEIs). Representatives from each of these constituencies were invited to contribute their perspectives on the new and emerging issues at this follow-up symposium organised by the Academy. In introducing the meeting, **Keith Gull** (University of Oxford and Chair of the Academy's Non-clinical Careers working group) summarised the Academy's activities in this area, noting the continuing importance of collecting evidence from all those involved and sharing examples of good practice. Building the good relationship between research fellow, research funder and HEI – described in the 2005 report as 'a trinity to unity issue' – is increasingly important in contributing to the strategic efforts to strengthen biomedical research capabilities in the UK.[1]

Biomedical fellowships – the funder perspective

The first session of the symposium assessed recent changes in the activity of funders in the provision and arrangements of biomedical fellowships together with their current thinking on policy developments.

David Critchley (Executive Director of Science, Cancer Research UK) observed that Cancer Research UK, only five years old, was still learning how best to support researchers. An annual spend on scientific research, now £270 million, is growing by about 8% annually and covers work on basic, clinical and translational research. Review of the non-clinical training programmes in 2006, stimulated by the Academy's 2005 report, concluded that the size of the workforce in cancer research was inadequate to support the Cancer Research UK vision. In consequence of identifying this mismatch, Cancer Research UK is working more closely with HEIs to build critical mass in priority areas, to expand career development schemes and to improve the early preparation of future researchers.

In addition to supporting approximately 300 PhD students, Cancer Research UK funds two principal fellowship schemes:

1. Career Development Fellowships at the post-doctoral level – key features of this scheme, in particular the relatively long duration of fellowship (six years)

[1] Recent national initiatives relevant to biomedical research training include: (i) The Cooksey Review of UK health research funding (December 2006); (ii) The Sainsbury Review of Science and Innovation (October 2007); (iii) The Council for Science and Technology Report "Pathways to the future: the early career of researchers in the UK" (October 2007); (iv) Research Councils UK Research Careers and Diversity Strategy (January 2007).

and the mentoring by a Fellowship Committee, were prompted by recommendations in the Academy's 2005 report.

2. Senior Cancer Research Fellowships – support at the lecturer stage, requiring HEI partnership to provide 50% of salary, reflecting another recommendation in the Academy's 2005 report.

Other issues emerging from the analysis of Cancer Research UK experience in funding fellows became pervasive themes for the symposium:

- The need to offer integrated, continuing support for fellows in addition to funding (Cancer Research UK provides management training, career advice and support for networking in an annual fellows meeting).
- The critical importance of clarifying and communicating the career track opportunities for the majority of researchers who will not be laboratory leaders and risk becoming embittered by apparent lack of other career prospects (Cancer Research UK is contemplating introducing Fellowships for Experimental Officers).
- The priority to provide research support and career progression in scientific areas other than cellular and molecular biology (Cancer Research UK schemes in Population and Behavioural Sciences).
- The needs to improve support for women in science and for the youngest researchers (for example by providing guidance and mentorship for making competitive grant applications).

Candace Hassall (Science Programme Manager, Wellcome Trust) emphasised that 'developing people' was a major strategic aim of Wellcome Trust, implemented through a range of personal training and career development schemes, tailored research capacity building and collaboration with other research funders (in particular on the recent revision of the Research Concordat and on the introduction of schemes for tracking individual career paths). The overall focus of the fellowship schemes is on quality rather than quantity of awards and recent changes in the personal support schemes, compatible with the recommendations in the Academy's 2005 report include:

- At the senior level, research fellows now have the opportunity to apply for competitive renewal on a rolling five year basis but the host HEI is expected to contribute half the basic salary of the fellow, on renewal.
- At the intermediate level, Research Career Development Fellowships have been extended to five years duration.

Other recent Wellcome Trust changes include introduction of the Sir Henry Wellcome Post-doctoral Fellowships to correct what was previously a gap in support immediately after PhD completion; new flexible Travel Awards (with either salary or sabbatical support); and increased funding for the pioneering four year PhD research training programme.

The need to recognise and support the career development of members of successful research teams who do not follow the fellowship career pathway and become team leaders was reiterated. A new scheme, Wellcome Trust/Howard Hughes Medical Institute Exchange Award enables members of UK research teams to benefit by visiting HHMI investigators (and vice versa).

Mary Bownes (Chair, BBSRC Studentships and Fellowships Strategy Panel) described some of the main BBSRC schemes, supported by a fellowship budget of £5.3 million. The David Phillips Fellowship scheme for researchers early in their careers has five year duration with possible two year extension, accompanied by support and monitoring activities that include an induction phase, fellowship workshops, mentoring, annual reporting and feedback from the Studentship and Fellowship Strategy Panel. As described in the Academy's 2005 report, career development tracking has been a strong feature of this fellowship scheme – current data show that 53% of the fellows are in permanent academic employment, 28% in further fixed-term academic post, 12% elsewhere in the public sector and 7% in industry.

Other major BBSRC fellowship schemes include Research Development Fellowships (for mid-career, encouraging movement between disciplines), Professorial Fellowships (senior career, to encourage novel research directions), Fellowship variants for BBSRC Institutes and the targeted collaborative schemes, Enterprise Fellowships (with Royal Academy of Engineering) and Industry Fellowships (with Royal Society).

Professor Bownes also reviewed progress with the Research Councils UK Academic Fellowships scheme (introduced following the Roberts Review), in partnership with HEIs to cover research, teaching, outreach activities, training and personal development: the allocation of many of these in biomedical research and interdisciplinary areas is welcome.

For all the Research Councils, there is increasing pressure to demonstrate, and enhance, the economic impact of their funding.[2] In this context, there is an ongoing challenge to improve systems for post-doctoral support within budget constraints in order to balance the objectives for personal training and career development with the imperative to deliver excellent science.

Carol Dezateux (Chair, MRC Training and Career Development Board) highlighted that the development of skilled scientists and researchers was central to the MRC's mission to improve human health. The Training and Career Development Board has responsibility for developing and reviewing the MRC research training schemes for biomedical scientists at each stage of their careers. These schemes are currently supported by an annual budget of about £73 million reflecting MRC's role as a key UK provider of research career opportunities. Post-doctoral fellowship schemes designed for non-clinical scientists include, for example, the generic Career Development Award (CDA), the Senior Non Clinical Fellowship and the New Investigator Research Grant. In addition, targeted awards are available to foster key disciplines, for example Training Fellowships in Health Sciences and Health of the Public Research, a Special Training Fellowship in Biomedical Informatics, the joint Collaborative CDA in Stem Cell Research and a CDA in Biostatistics. These targeted awards allow MRC to build capacity in response to agreed strategic priorities balancing clinical and non-clinical interests, building new partnership with industry (as proposed by the Cooksey Review) and other research funders.

[2] The Report from Research Councils UK 'Excellence with Impact' (October 2007) describes examples of the impact of Research Council work. http://www.rcuk.ac.uk/cmsweb/downloads/rcuk/economicimpact/excellenceimpact.pdf

In this new era of Fixed Economic Costs subvention, the MRC also recognises that there is growing opportunity for using research grants to support career progression - a development that was predicted in the Academy's 2005 report and one that allows increasing flexibility in support of researchers. Other specific changes made by the MRC following the Academy's 2005 report include the extension of fellowship term to five years and the introduction of mentoring. Awards have been designed to be flexible in order to maximise retention of talented scientists and their return to research after a career break.

An independent review of the MRC's investment in training in 2006 endorsed the importance of funding fellowships, with recommendations for increasing partnership to support interdisciplinary research, improving tracking of fellows and soliciting increased commitment from the host HEI. Continuing challenges for MRC-supported training, as for the other funders include how to demonstrate impact, collect robust metrics, balance budgets across career paths, research portfolio and disciplines, and improve links with industry and mentoring. One other, emerging, challenge is how to respond to global health issues, both in terms of defining training priorities and in opening fellowship schemes to foreign graduates.

Christopher Buckley (Fellowship Implementation Committee, Arthritis Research Campaign) reviewed ARC fellowship schemes, accounting for a high proportion, 34%, of the ARC current annual research budget of £18.5 million. A range of schemes are available for clinical non-clinical and allied health scientists. In common with the other funders, some of the key drivers for these schemes can be traced back to the influence of the Academy's 2005 report and schemes include an extended, five year, term (renewable for three year) Career Development Fellowship for post-doctoral scientists, Career Progression Fellowship (50% funded from the HEI) and a new Foundation Fellowship for immediate post-PhD (similar to The Wellcome Trust initiative).

The point was again emphasised that fellows will only constitute a small proportion of post-doctoral researchers so that it is vital to provide better career development, including much better information on options and consistent mentoring, to those who do not get onto a fellowship track. This issue also received considerable attention during general discussion:

- Funding allocated following the Roberts Review is available for training programmes for non-fellow researchers but it is not clear if all HEIs are adopting best practice in supplying training courses (examples of best practice were discussed subsequently).
- It is very important to build industry involvement in supporting researchers by funding joint posts in industry and academia and by promoting mobility between the sectors in other ways. As recommended in the Academy's 2005 report, there is also a strong argument in favour of something analogous to CASE Awards (industry-supported PhD studentships) at the post-doctoral level. It would also be worth exploring the potential for a UK version of the US scheme of laboratory set-up grants for those moving from industry to an academic post. When recruiting researchers from industry, there is a related challenge for the academic sector to find ways to value the different skills and research outputs of industry scientists.

- In promoting collaborative work between academia and industry, there are good examples of links with major pharmaceutical companies but it has been harder to involve the smaller companies. Reiterating the point made in the Academy's 2005 report, there is potential for building regional involvement around bioscience centres of excellence – and this is a challenge for the Regional Development Agencies. Many of these issues were discussed in greater detail in a recent report from the Academy, summarised in Box 1.

Box 1 Research careers in the biomedical sciences: promoting mobility between academia and industry.

Report from the Academy of Medical Sciences, September 2007 covered four main areas:

Fostering interactions between academia and industry – building a collaborative culture, supporting and publicising current exchange schemes, expanding opportunities for secondment between the sectors at all points in the career path.
Promoting flexibility in career options– provision of advice on opportunities, support for researchers moving from industry to academia, indicators of esteem, success and professional development that are transferable across the sectors, extension of mentoring schemes to cover industry scientists.
Raising awareness– better communication of information throughout the education system on career paths and better interaction at the regional level.
Gaining greater understanding of the UK biomedical research workforce profile – tracking, collation and appraisal of data on scientists in different sectors.

- The NHS is also a viable career option for post-doctoral scientists but discussants doubted that this information is always available to researchers contemplating their career options. While it is recognised that the NIHR initiative needs to be properly implemented before other funders can consider the opportunities for NHS partnership to support researcher career options there is some disappointment that the Department of Health has not taken a lead to provide role models to inform and encourage younger researchers.
- There is a common element in the diverse needs to provide information on career opportunities and the mentoring needs to provide feedback on the researcher's expectations and skills – the Principal Investigator (PI). The PI has the core role to manage and train their researchers and discussants proposed that PIs should be accountable on these functions when being evaluated in their applications for new grants.

New forms of partnerships – HEI perspectives

In opening the second session of the symposium, **Christian Carter** (Personnel Manager, University of Bristol) provided an overview of the shifting employment landscape for research staff, necessitating interpretation of the likely consequences of research policy initiatives in the context of what is possible within the employment legal framework. The landscape established by the 1996 Employment Act governing Fixed Term Contracts

(FTCs) is changing in consequence of the Fixed Term Employees Regulations of 2002, which stipulate that FTCs should be treated in the same way as permanent staff and that successive FTCs must be restricted. HEIs have varied in their interpretation of whether limited external funding can be cited to justify use of FTCs on "objective grounds". The University of Bristol has said they cannot be justified for this reason and has now reached collective agreement with Trade Unions on a set of criteria for the use of FTCs (in particular, their retention for scientists in their first research role): 50% of researchers have moved from FTC to permanent contract. The University of Bristol has also now introduced various other forms of support for research staff in terms of training provision, careers advice, dedicated website and annual conference, and consults with researcher representatives on Human Resources policy developments. There is equity of reward for career paths in teaching, research and administration functions, set according to a common job evaluation system. Discussion explored some of the lessons learned by the University of Bristol – in particular the importance of initiating strategic action for business-related, not legal reasons; the need to agree criteria for evaluating success of the strategy (measurement of impact to date has been confined to polling workforce responses); and considering how to involve PIs in change management.

In a series of presentations, contributors from HEIs provided their perspectives on different aspects of the training landscape and support for innovation – with particular reference to the partnerships with funding agencies and the impact of FTCs, Fixed Economic Costs and Roberts funding.

Martin Humphries drew on experience within the Faculty of Life Sciences, University of Manchester in describing the core role of fellowships in supporting the substantial growth of life sciences and an increasing emphasis on team working. Of the 242 independent group leaders in the faculty, 94 have had a fellowship or currently hold one. In targeting fellows for the transition from fellowship funding to university funding, the university decides on sponsorship of a fellow according to the criteria of strategic fit and the faculty space/budgetary plans in addition to the fellow's CV. Once in post, all fellows are treated equivalently to academic staff in terms of annual appraisal and mentoring. 12-18 months before the end of the fellowship, the university considers the case for underwriting for future employment. The success of the targeting and underwriting mechanisms is attributed to formalisation and transparency of the processes of recruiting, mentoring and evaluation but the strategy is deemed only likely to work in a large faculty, able to operate on a scale that reduces the risk of uncertainty in research and employment, and where there is considerable flexibility to plan the selection of new staff. Subsequent discussion noted that smaller HEIs may need to collaborate to achieve the necessary critical mass.

Peter Downes (Vice Principal and Head of College of Life Sciences) reviewed efforts by the University of Dundee to establish the infrastructure for research competitiveness mediated by translational and interdisciplinary work, requiring the creation of strategic partnerships and a longer-term financial perspective that takes account of all forms of income to deliver the academic goals.

There are 26 fellows in the current cohort of 65 PIs and the tenure track strategy is relatively similar to the University of Manchester, 'harnessing external fellowship schemes to sustain academic growth'. The University of Dundee is actively addressing the career development challenges for those researchers who will not become PIs by encouraging their acquisition of appropriate, generic skills in their progression from science graduate. Unlike some conventional HEI views, there is a basic assumption at Dundee that one measure of success of the career track is the movement of skilled post-doctoral scientists into industry, NHS and other public sector laboratories to sustain the knowledge-led economy – reproducing externally the Dundee life sciences strategy to create and nurture new nodes of activity. A cultural change is needed if other universities are to widen the career options available to researchers.

Maggie Dallman (Deputy Principal, Faculty of Natural Sciences) described initiatives at Imperial College London to use resources provided following the Roberts Review of 2002, which had recommended additional training in transferable skills for PhD students and post-doctoral researchers. At Imperial College, this resource has been pooled and controlled centrally to employ senior lecturers, who provide consistency across the college in training and mentoring activities. One key to success has been the provision of separate training programmes for postgraduate and post-doctoral students. Training covers the principal areas of research skills and techniques, research environment, research management, personal effectiveness, communication skills, networking, team working and career management. In addition, there is a major commitment made to interacting with industry – exemplified by a research arrangement with Merck for short-term exchange of staff at all levels. It is, again, recognised as vital to address the needs of researchers who will not become PIs – one alternative career opportunity has been explored in the Mini-INSPIRE initiative in collaboration with GlaxoSmithKline, where post-doctoral scientists spend time in school training for a teaching career.

Agreeing with the point made by other contributors on the importance of aiding the early careers of women in science, engineering and medicine, Imperial College provides a range of support including one year fellowships for those returning from maternity, operation of the senior women staff network and the ambassadors for women scheme.

John Harwood (Head, School of Bioscience) reviewed the range of training programmes at the University of Cardiff which, like Imperial College, has separate programmes for postgraduate and post-doctoral training. Separate staff development programmes have also been constituted to cover the needs of the two academic career tracks at Cardiff – the teaching-focused tutor track and the lecturer track. The success of the strategic framework for staff policy and development depends on a series of support activities during induction and probation (a clear framework to receive guidance, encouragement, training and development support), mentoring (the mentor is not the same person as the line manager) and an annual appraisal scheme. However, it has been found important that the standard rules and processes for development are interpreted flexibly, based on dialogue with the individual academic.

Andrew Lloyd (Dean, Faculty of Science and Engineering, University of Brighton) provided a case study of a newer HEI, where the objective to support and develop

research staff is being achieved without a lengthy track record of the HEI in research. The University of Brighton has received only limited Roberts funding; this has been augmented by university funds and used centrally to support researcher training in technology commercialisation as well as in management and leadership skills. The introduction of Fixed Economic Costs has also had only limited impact so far although it is releasing additional resource to support a key activity of bridging between successive research grants and is anticipated to facilitate the more flexible employment of researchers within teams. In consequence of these changes, and a pronounced focus on mentoring, continuing professional development and redeployment where appropriate, there is a growing number of post-doctoral researchers joining the academic staff and, like the University of Bristol, the researchers are demonstrating greater commitment to the HEI. New support for post-doctoral researchers has been a strong contributory factor in the improved faculty performance in successive Research Assessment Exercises; among continuing challenges is the need to manage individual academic staff expectations and to ensure that all academic staff are committed to researcher development. It is also seen as critical to capitalise on opportunities to import expertise from outside the HEI, in particular by increasing the provision of sabbaticals.

Discussion and conclusions

The final discussion session chaired by **Darrell Evans** (Brighton and Sussex Medical School) and **Anne Donaldson** (University of Aberdeen) invited further perspectives from younger researchers, reinforcing many of the points made earlier:

- Post-doctoral researchers do not receive sufficient information through the HEIs on alternative career options. Sources of careers advice (in particular, the UK GRAD Programme) may not be familiar to researchers or their PIs. Young researchers perceive that some PIs are not interested in a mentoring role. PIs need training in management and to be accountable for the training of those they supervise but it is also the case that young researchers need to take more responsibility to be proactive in seeking advice.
- While mentoring can help to inform and facilitate broader career aspirations, the success of mentoring in this regard is usually not evaluated, but should be. Opinions differed on whether all career advice should be communicated through a single mentor or whether a culture of mentoring could be established to enable the individual researcher to consult a wider range of sources.
- It is essential to introduce consistent tracking systems for fellows and for all graduates. The Research Careers Mapping Tool is a valuable initiative but tracking must be extended to include those research careers outside of academia. The exclusion of industry research from tracking reinforces the unfortunate impression that such research is somehow inferior.

In his closing remarks, **Keith Gull** observed that much has changed since the Academy's 2005 report. There are still HEI weaknesses to tackle by sharing good practice to maintain the momentum for building research capacity, to embed the key improvements in researcher mentoring, retention, diversity and mobility between the sectors, while collecting the evidence on what works. The plurality of research funders is a significant

strength for the UK if that diversity serves as a basis to encourage new approaches and to sustain new partnerships.

Appendix I programme

10:00	Registration and coffee	
10:30	Welcome	Professor Dick Denton FRS FMedSci, University of Bristol
10:35	Chair's welcome	Professor Keith Gull CBE FRS FMedSci, Chairman, Academy of Medical Sciences' Academic Careers Committee (non-clinical)
10:45	**1. Biomedical Fellowships** – recent developments and current thinking of funders	Presentations from: Professor David Critchley, Cancer Research UK Dr Candy Hassell, The Wellcome Trust Professor Mary Bownes, The Biotechnology and Biological Sciences Research Council (BBSRC) Professor Carole Dezateux, Medical Research Council Professor Chris Buckley, Arthritis Research Campaign
12:00	Q & A	Debate and discussion with the panel of funders
12:30	Lunch	
13:30	**2. New forms of Partnerships** 2a. Employment factors influencing new partnerships between HEIs, funders and individual researchers	Mr Christian Carter, University of Bristol
14:00	2b. Changing patterns of how individual HEIs are handling the careers of Biomedical Fellows and Lecturers	Presentations from: Professor Martin Humphries, University of Manchester Professor Peter Downes, University of Dundee Professor Maggie Dallman, Imperial College London Professor John Harwood, Cardiff University Professor Andrew Lloyd, University of Brighton
15:15	Q & A	Debate and discussion with HEI panel
15:30	Tea/ Coffee	
15:45	Observations, feedback and questions from a group of young Fellows.	Chaired by: Professor Darrell Evans, Brighton and Sussex Medical School Dr Anne Donaldson, University of Aberdeen
16:15	Concluding remarks and summary of recommendations	Professor Keith Gull CBE FRS FMedSci
16:30	Close	

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