



The Academy of
Medical Sciences

The freedom to succeed

*A Review of Non-Clinical Research Fellowships
in the Biomedical Sciences*



A report from the
Academy of Medical Sciences

July 2005

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Registered Charity No. 1070618
Registered Company No. 3520281
Registered in England
ISBN No: 1-903401-09-7



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Acknowledgements

The Academy of Medical Sciences is most grateful to Professor Keith Gull CBE FRS FMedSci and the members of the Committee for conducting this review. It would also like to thank all the respondents to the consultation for their instructive comments and support.

Cover painting:

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The members of the Working Group participated in this report in an individual capacity and not as representatives of, or on behalf of, their individual affiliated hospitals, universities, organisations or associations (where indicated in the appendices). Their participation should not be taken as an endorsement by these bodies.

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Chapter one: *Summary and recommendations*

1.1 Research fellowships awarded on an individual basis, through competitive external funding, now represent an essential part of the career path of some of the best biomedical scientists in the UK. During the 1990s the number and type of fellowships proliferated and some Higher Education Institutes (HEIs) used research fellowships as an integral part of their research strategies. Others, lacking an integrated strategy, accommodated fellows as and when their awards were made.

1.2 The result of this proliferation is that there is now a considerable cohort of research fellows in UK biomedical university and institute departments. A substantial number of these are accumulating in the later stages of their fellowships, raising issues about the career paths that are now open to them, and that they will choose to follow. It was in the context of sustainability, and current fitness for purpose, that the Academy of Medical Sciences decided to conduct this review.

1.3 While the design of fellowship schemes is not an exact science, and there cannot be a single solution for all HEIs¹, this report seeks to define a number of **key principles** and makes **recommendations** on how best use can be made of research fellowships by the holders, HEIs and granting agencies in the current climate. These are summarised below.

1.4 The review continues earlier work undertaken by the Academy on the career prospects of non-clinical scientists in medical research.²

Fellowship schemes

1.5 The UK research community is best served by maintaining a diversity of research fellowship schemes funded by different funding agencies, even though some fellowship funding schemes need refinement and a greater definition of purpose.

1.6 Funding agencies should concentrate on

improving the quality of provision of their existing fellowship schemes, rather than increasing the number of places available. For targeted fellowships in specific disease areas or to build capacity, the numbers funded should be in accordance with long term sustainability.

1.7 Fellows and HEIs should view a fellowship as a career opportunity and not as a defined career path. Planning for the exit of the majority from the fellowship schemes should be a priority for individual fellows and HEIs.

1.8 We recommend that early career fellowships should be awarded for no less than 5 years, even if this means a reduction in the number of awards. Moreover, to stimulate HEI focus on sustainability, strategic 'fit' and the quality of the fellowships and individuals they are proposing to host, HEIs should make a financial commitment to the later stages of the fellowship.

Research funding statistics

1.9 We recommend that all funding agencies should collect, and display on their web sites, statistics on numbers of applications and awards, with gender information. Statistics on progression and renewal rates for fellowships in their portfolio should also be included. This information should be regularly reviewed within the agency. A consistent format would facilitate meta-analysis for the UK fellowship system as a whole, and contribute to a more strategic appraisal of fellowship schemes.

Career expectations

1.10 HEIs should develop better partnerships with their fellows to boost the appeal of an academic position. A powerful way for HEIs to increase confidence in this career route would be through better management of research and teaching time for excellent researchers in HEI academic positions.

¹ The term *Higher Education Institute* should be taken to include universities, research institutes and units.

² *'Non-clinical scientists on short term contracts in medical research.'* February 2002.

A research fellowship in industry

1.11 Research councils and some charities should develop better connections with industry in their fellowship programmes. Industry also has a responsibility to target this cohort of talented researchers to ensure greater awareness of the careers open to them. We recommend that a new, co-funded fellowship programme in the biomedical sciences be developed by the regional development agencies and/or research councils, that would facilitate movement of talented scientists between HEIs and industry.

Career destinations

1.12 We recommend that final reports on individual fellowships should be obtained and analysed by the funding agencies. They should collect, maintain and publish agreed data sets on the career destinations of fellows. Groups such as Research Councils UK (RCUK), the Association of Medical Research Charities (AMRC) and the Funder's Forum could usefully coordinate agreement on a basic template of the metrics to be collected, and then publish period overview analyses for the UK.

Mobility issues

1.13 Flexibility in the use of a fellowship, and mobility after the award of a fellowship, is valuable and should be embedded in the initial conditions of the fellowship.

Career planning and personal development

1.14 HEIs should aim for clarity in the terms of the fellowship agreement from the outset. There should be transparency in the matter of career opportunities available to fellows, and mentoring and appraisal should be provided either by the funding agency, host HEI or preferably both. Fellows, for their part, must assume responsibility for their own career planning, and should be willing to undertake some (limited) activities to support the host HEI and to develop teaching and management skills that may be useful to them in their future careers. Experience of communicating science to the general public would also be beneficial.

Dealing with a changing world

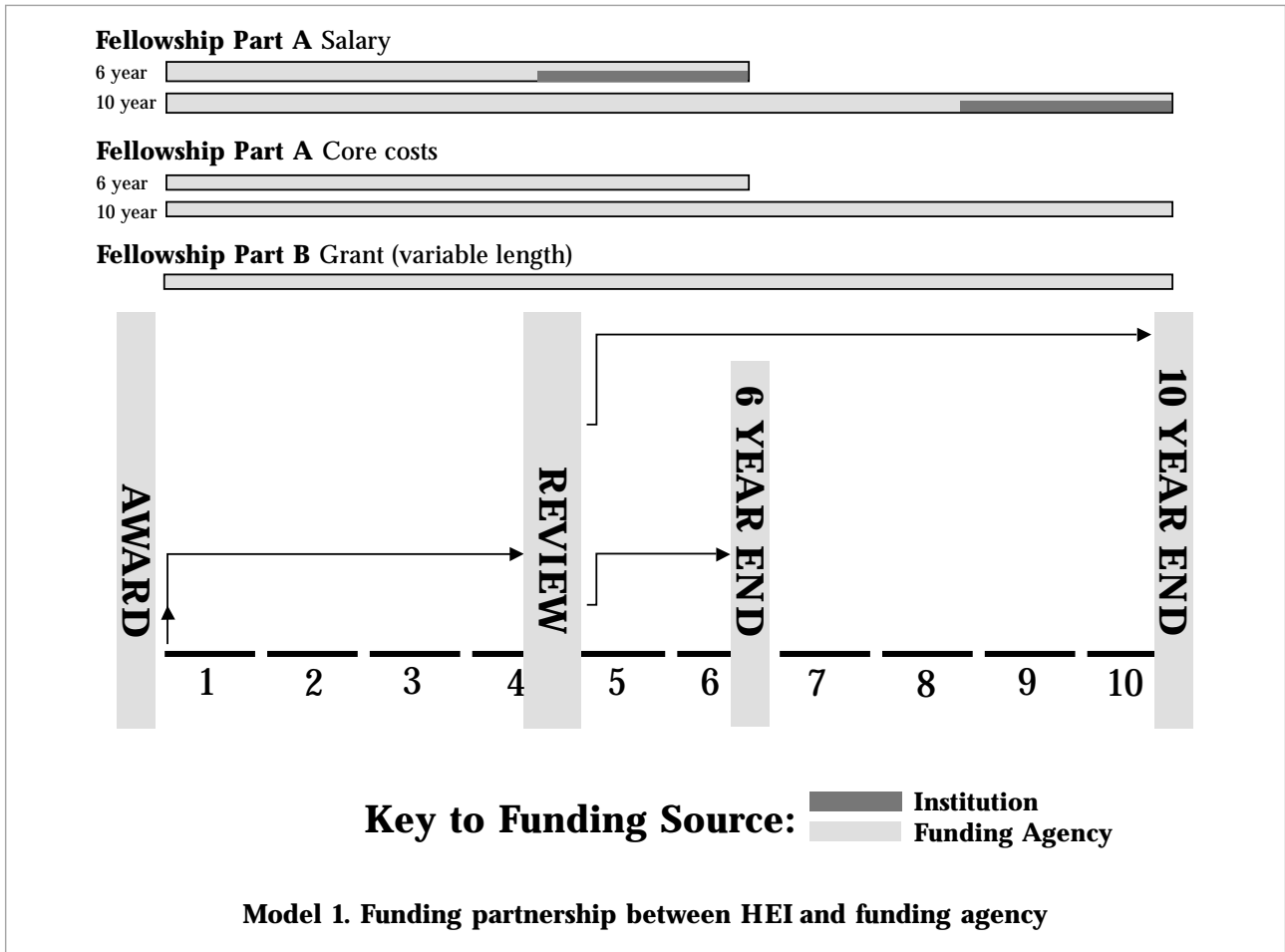
1.15 HEIs should develop a defined policy for fellows based on EU employment directives. Plans for full economic costing (fEC) of fellowship grants should also be carefully considered to facilitate individual research career opportunities for fellowship holders and active Higher Education Funding Council (HEFC)-funded researchers.

1.16 We recommend that research fellows who hold an externally peer-reviewed independent research fellowship should be (a) included in the 2008 Research Assessment Exercise (RAE) submission and (b) included in the subsequent funding model. In this context, they should be treated as the equivalent of HEFC academic staff members.

Models of early career fellowships

1.17 In this report, we present models of early career fellowships based on good practice that are designed to allow our most promising young biomedical scientists to develop as world class

independent researchers. The figure below illustrates the Academy committee's preferred funding partnership between the HEI and the funding agency.



Chapter two - *Introduction*

Background

2.1 Research fellowships awarded on an individual basis, through competitive external funding, now represent an essential part of the career path of some of the best biomedical scientists in the UK. During the 1990s the number and type of fellowships proliferated and some Higher Education Institutes (HEIs) used research fellowships as an integral part of their research strategies. Others, lacking an integrated strategy, accommodated fellows as and when their awards were made.

2.2 The result of this proliferation is that there is now a considerable cohort of research fellows in UK biomedical university and institute departments. A substantial number of these are accumulating in the later stages of their fellowships, raising issues about the career paths that are now open to them, and that they will choose to follow.

2.3 Recent movements in the medical charity and research council sectors have brought about an overall reduction in the number of fellowships. In addition, a number of external influences are all likely to influence the future pattern of personal awards. These include EU employment directives, the introduction of full economic costing (fEC) for grants funded by research councils, and the introduction of 1000 Academic Fellowships by Research Councils UK (RCUK) following the Roberts' Review. It is in the context of sustainability and current fitness for purpose that the Academy of Medical Sciences decided to conduct this review.

Research fellowships in context

2.4 This review focuses on non-clinical research fellowships in the biomedical sciences. We have concentrated on the operation, successes and weaknesses of the different fellowship schemes that have operated within the UK over the past 20 years. However, we have conducted our review within the wider context of issues influencing:

- routes of entry into fellowships in the early career period, such as developments in graduate education and post-doctoral training
- routes of entry into mid- and late career fellowships, such as fellowship renewal, temporary exit from lecturing and administrative duties, return or re-location to, and in, the UK, and other major career changes
- routes of exit from fellowships, such as interactions with funding agencies and host institutions, proleptic appointments, transfer of institution, maintenance of the research group and funding.

A definition and overview of non-clinical fellowship schemes

2.5 Research fellowships are personal awards that fund the salary of the fellow for periods of 1 to 10 years, with varying degrees of support to cover the cost of the fellow's research. They are distinct from funding used to support post-doctoral staff (even named) on research grants. Many individual funders, including research councils, charities and industry, have schemes for research fellowships. Thus fellowships are an important form of support for some of our most able non-clinical biomedical scientists.

2.6 The UK biomedical research area benefits from the investment of many individual funders representing government, charities and industry. Virtually all of these funding agencies have specific schemes for personal awards designed in whole, or in part, to facilitate the individual's research effort. Some of these fellowships have been in operation for over 20 years, but many have been developed, or changed substantially, during the 1990s. Fellowships come in a variety of forms. However they can usefully be grouped into 5 themes:

Independent/early career fellowships

Entry to these fellowships is usually via a period working as a *'steps to independence'* named post-doctoral fellow in the laboratory of a senior

scientist. We view such training as an important prerequisite. The independent/early career fellowship establishes the independence of new investigators after the post-doctoral period. These fellowships may be of variable length, depending on the scheme, but are typically 3-6 years. Sometimes this is seen as enabling the early career, or as aimed specifically at facilitating a permanent academic position.

Examples include:

Biotechnology and Biological Sciences Research Council (BBSRC) David Phillips Fellowships, Royal Society University Research Fellowships, Medical Research Council (MRC) Career Development Awards, Wellcome Trust Research Career Development Fellowships, British Heart Foundation (BHF) Intermediate Research Fellowships, Diabetes UK RD Lawrence Research Fellowships, and Cancer Research UK (CR-UK) Career Development Fellowships.

Mid career/senior fellowships

These provide a research-intensive period for senior scientists with the possibility of renewal, most often with an attached grant for the research. Applicants are usually required to have 5-10 years' post-doctoral experience.

Examples include:

Wellcome Trust Senior Basic Biomedical Sciences Fellowships, MRC Senior Non-Clinical Fellowships, CR-UK Senior Cancer Research Fellowships, Diabetes UK Senior Research Fellowships and BHF Senior Research Fellowships.

Professorial/principal fellowships

These provide a research-intensive period for very senior scientists, most often with an attached grant for the research. They are sometimes, but not usually, renewable.

Examples include:

Wellcome Trust Principal Research Fellowships, BBSRC Professorial Fellowships, MRC Professors, BHF Chairs, CR-UK Principal Research Fellowships and CR-UK Gibb Fellowships.

Research-leave fellowships

These are designed to allow a variable period of intensive research for staff who already have tenured positions in UK universities. This is sometimes a period in their own laboratory, sometimes a sabbatical period overseas or a period in industry.

Examples include:

Leverhulme Trust Research Fellowships, Royal Society Industry Fellowships and BBSRC Research Development Fellowships.

Training or capacity building fellowships

These are often fellowships of shorter length designed to facilitate personal skill training or re-training, or to allow re-entry into research after a career break. They can be individual-led, or have a designated theme and are then used to build a cohort of new talent in that research area.

Examples include:

Royal Society Dorothy Hodgkin Fellowships, Wellcome Trust Research Career Re-Entry Fellowship Scheme and a large variety of fellowships run by research councils (BBSRC, MRC and the Engineering and Physical Sciences Research Council, EPSRC) and charities to build capacity. Recent topics have included bioinformatics, stem cells, neuroinformatics and mathematical biology.

The diversity of fellowships

2.7 While all these fellowships have the intended aim of supporting a concentrated period of research time for an individual scientist, they differ in certain key features:

- Personal financial support of the individual: most fellowships provide the fellow's salary, although some actually provide funds for a replacement position when the awardee already holds a tenured position.
- Conditions of award: the fellowship length, possibility of renewal, a safety net fund at denial of full renewal, financial commitment to personal costs and travel all vary enormously. In addition, some fellowships carry guidelines for the commitment required by the host HEI (in terms of space, teaching and administration load).
- Research support grant: some fellowships focus mainly on the two items above without a particular commitment to funding for the employment of other staff, students, consumables or equipment for the research project. There is a spectrum of support in this category, from a lack of support to full support of a research group. This spectrum is a reflection both of different funding agency policies, and of the type and level of fellowship.

Chapter three - *Method of working*

- 3.1 The Academy Committee adopted the following method of working. It started work in late 2003 and met twice to determine how to conduct the review, what issues were likely to be included, what data would need to be gathered and how the outcomes would be presented. It was agreed that the Committee would conduct an analysis of the fellowship models used in the UK biomedical research community and that the output would be a report that identified enabling or inhibitory factors influencing the progress of the fellow and their ultimate career outcome. It would also debate how current and forthcoming issues might impact on fellowship schemes. The review would define the best practice in, and characteristics of, a successful fellowship model. The report would take the form of a narrative focusing on three aspects: the funder, the fellow and the host institution.
- 3.2 It was agreed that a broad spectrum of schemes funded by both medical research charities and the research councils would be studied in a comparative manner. Emphasis would be on early to mid-career fellowships and these would be examined in career context (how the scheme was entered and how it was exited). It was agreed that 'fellowships' used to obtain a PhD or post-doctoral fellowships, used by the holder for research under the guidance of a separate principal investigator, would not be included. These schemes were studied for the Academy report 'Non-clinical scientists on short-term contracts'³. There is often a need for shorter schemes that are post-doctoral in nature. They are awarded in concert with a particular host laboratory or group, and are aimed at providing training, or have an apprenticeship form of relationship to the sponsor. We believe that such schemes, while welcome, should be clearly differentiated as 'a step to independence' rather than an independent fellowship, and are thus outside the scope of this review.
- 3.3 Information and views from current fellows were gathered in early 2004 by arranging focus groups in different regions of the UK. These were chaired by members of the Committee, and, in one case, by Dr Tanya Whitfield of the University of Sheffield. Focus group members included fellowship award holders from a variety of schemes, from different departments and, in a number of cases, from local universities. A template of suggested questions and topics for the focus groups was drawn up and used by all focus groups (*Appendix 1*).
- 3.4 The focus group reports were debated and common, and particular themes, identified. These refined the issues that were later discussed in meetings of the Committee with representative funding agencies. In addition, the Committee obtained a variety of quantitative information from these funding agencies. Most meetings with funding agencies (held between September 2004 and January 2005) involved the agency's chief executive, as well as staff members involved with the fellowship schemes and academic chairs of fellowship committees.
- 3.5 Given the vast differences in management structures now used in biomedical research universities, uniform points of contact (vice chancellors, deans, heads of department) within different host institutions were not likely to elicit the required detail on generic issues. The Committee did not analyse individual universities. Rather, it gathered general points pertaining to host institutions as well as examples of good and bad practice to inform its discussion. The major generic outputs from the structured meetings with focus groups and funding agencies are given in two appendices (*1 and 2*).
- 3.6 We held focus group meetings with cohorts of research fellows from 10 HEIs: the Universities of Aberdeen, Bristol, Cambridge, Dundee, Edinburgh, Manchester, Newcastle Oxford, Sheffield and Sussex. No less than 7 fellows from each university were involved in an extensive analysis of the issues confronting fellowship holders. The fellows covered the full range of age,

³ *Academy of Medical Sciences. February 2002.*

experience and seniority of fellowship type. Many fellows had moved between institutions; some were educated abroad and had been attracted to the UK by the fellowship schemes. A number also had partners in science and there was a good gender balance. We found the fellows to be very informed about the relevant schemes.

3.7 In total we interviewed 65 fellows holding the following types of fellowships that span the research councils and medical charities and include a few (3) named university fellowships:

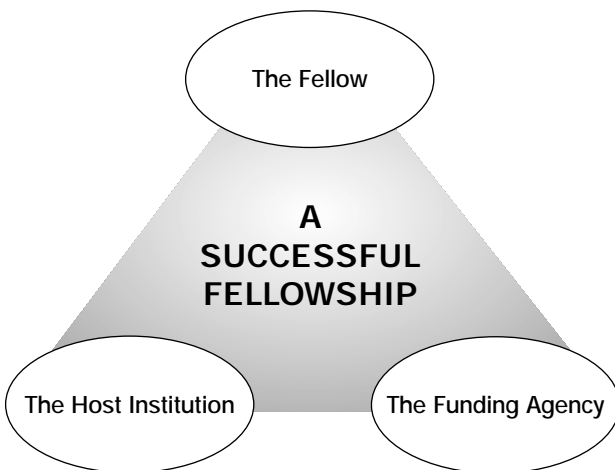
Royal Society University Research Fellowship
Royal Society Dorothy Hodgkin Fellowship
MRC Career Development Fellowship
MRC Senior Research Fellowship
BBSRC David Phillips Fellowship
Wellcome Trust Research Career Development Fellowship
Wellcome Trust Training Fellowship
Wellcome Trust Senior Research Fellowship
Wellcome Trust Principal Research Fellowship
BHF Fellowship
Lister Fellowship
CR-UK Career Development Fellowship
Named university fellowships

3.8 The funding agency meetings involved The Wellcome Trust, BHF, MRC, BBSRC, CR-UK, AMRC and the Royal Society. We also contacted a number of other charities and funding agencies over specific issues.

3.9 The Committee analysed a large amount of published information on fellowship schemes, as well as information on university and funding agency websites. The Committee chairman and members discussed the issues with a wide range of colleagues in their own and other institutions, as well as with current award holders, past award holders and funding agency staff.

Chapter four - *Problems and emerging issues*

4.1 Research fellowships are by definition a form of research funding that is as much concerned with the development of the individual scientist, as with the science that gets done, and it was to the former aspect of the fellowship schemes that the Committee devoted its attention. In essence, success in this venture involves getting the fellow, the funding agency and the host institution to work effectively together - a trinity to unity issue:



4.2 Research fellowships were consistently described as being the most prestigious form of research funding, with the awardees representing a cohort of the very best scientists and research leaders. The importance of this intellectual capability to the biomedical sciences research base in the UK demands that all parties share a common, unified view, to ensure that schemes remain fit for purpose and contribute to the successful career paths of the fellows.

4.3 The Committee found that there were areas to be applauded in the schemes that were presently running, and in the roles of fellows, funding agencies and host institutions. However, in none of these three camps was good practice uniform. Moreover, there are a number of current and horizon issues that will test the robustness and attractiveness of the research fellowship as a prestigious career path over the next 20 years. We have gathered these issues and listed them in outline in the paragraphs below. We then analyse them in detail and suggest recommendations and

actions. Finally, we have addressed some issues in the form of templates for recommended good practice.

The fellow

4.4 The issues here are much influenced by the personality and position of the fellow, but our discussions with fellows suggest that problems exist concerning the level of ownership that some fellows assume for their own career development. Most fellows will end up in academic positions that demand skills in teaching and administration. The fact that many fellows define their fellowship in a rather negative manner as 'not being a lectureship', and take little opportunity to gain skills and training outside of research, is disturbing. A level of naivety exists among a minority of fellows over these issues as well as over the likelihood of being able to continue in a research-only career. There is a tendency to view the fellowship as a career path, whereas it should be seen as career opportunity.

- Many fellows have little contact with industry and most do not consider this as a career route. This is of real concern, and both industry and fellows have a responsibility to recognise the value that each brings to British scientific endeavours.
- The degree and quality of the fellow's contact with the funding agency and HEI varies considerably; some of the solutions to this issue of awareness and interaction must also involve greater initiative on the part of the fellow.
- Specific issues relating to family responsibilities still exist for fellows with families, or fellows with partners who are also scientists. Some fellowship programmes encourage movement to the UK from abroad, or movement between institutions in the UK. This can place inordinate pressure on fellows, as it can be very difficult for their partners to find new jobs. Enforced mobility can be stressful for fellows with children, who have to be moved to new schools. The high cost of childcare and

accommodation in some cities means that fellows are often compelled to live some distance from their place of work.

- There are problems with the status of many fellows in particular universities. However, in return for improvements and formalisation of good practice in these universities, fellows will need to examine their contribution to departments over and above their research output.

The funding scheme

- 4.5 Much prestige is associated with the research fellowship schemes in the UK. They are beneficial to the fellow, the funding agency and the host institution. However, in the wider sense, they are also key to attracting excellent scientific talent to the UK and keeping it there. Any changes to the funding schemes will need to ensure that this prestige and fitness for purpose is maintained.
- 4.6 Some early career, or career development, types of fellowship do not appear to be very effective, often because they are of too short a duration for high impact science to emerge and for the fellow to build and maintain an effective, core research team. In reality, fellows on these schemes are essentially independent scientists; we found that they have often accepted such positions in preference to lectureships. Yet the details and conditions of some schemes appear to operate against this independence.
- 4.7 Diversity in the portfolio of UK fellowship schemes is a good thing, but there could be improvements in the operation of some schemes. The balance between different portions of the award (personal salary, core support and a grant for research) in relation to the length of the award, and the number supported each year, is important. In addition, a lack of clarity in schemes over the relationship with the HEI (for instance, in expectations of teaching commitments) is often a perceived difficulty.

The host institution

- 4.8 There are excellent examples of good practice in HEIs' handling of both the general requirements of a cohort of fellows, and those of the individual fellow. However, some institutions have failed to address the need for a transparent policy as regards this set of independently funded research fellows in their departments. Problems of mentoring, appraisal, promotion, training and status exist in many universities. Devolvement of these responsibilities to the sponsor of the fellowship, or even to the department, is unsatisfactory, given the need for decision-making during the award period and in its final stages. At those times, decisions on proleptic appointments, renewal or underwriting need to be made openly and quickly.
- 4.9 Lack of clarity in this issue also contributes to unsatisfactory arrangements in practical matters such as provision of space, access to university funds and studentships, expectations of teaching commitments and administration. In this context, the level of communication with the funding agency is sometimes less than optimal.
- 4.10 Many HEIs do not appear to have systems in place for regulating the teaching and administrative loads of young, research-intensive staff. As a result, many talented researchers see a fellowship as a means of avoiding a lectureship position in their early career, or use it to gain a break from teaching in their mid-to late career. This would suggest that there is still much that should be done by HEIs to protect research time for the most talented academics.
- 4.11 In universities with large concentrations of fellows, the management of fellows' career development is not always handled with the skill or commitment that it should be. In particular, interactions between fellows and the human resources (HR) and finance departments could be improved.
- 4.12 University policies on the operation of EU

employment directives appear not to be well developed in many instances. Universities also appear to be approaching the opportunities presented by the RCUK Academic Fellowships in different ways.

The funding agency

4.13 There is no doubt that all funding agencies operate research fellowship schemes of distinction and prestige. However, at times there appears to be a lack of clarity as to the ideal shape of this portfolio. We learnt of concerns about the appropriateness of particular fellowships, and whether they are successful. The lack of a holistic view on the shape of the portfolio across funding agencies suggests that informed strategic planning is difficult.

4.14 A series of issues relate to the gathering of statistics on fellowships and their use for internal review and planning. Lack of such intelligence and good practice also inhibits appropriate feedback to fellows. In addition, refinements of the type of information gathered (such as renewal, extension or progression rates and career destinations) and its publication could usefully defuse much speculation about the possibilities of particular career paths for fellows. For instance, the occasional reluctance of fellows to move into a lectureship post after denial of renewal, or progression of a fellowship, needs to be addressed.

4.15 Development of a greater commitment from the HEIs, partnership with them and the encouragement of good practice, are largely the responsibility of the funding agencies.

4.16 Good practice can be developed through the use of a wider fellowship of past award holders, or committee members, to act as mentors to existing fellows. The Academy of Medical Sciences is considering an extension of its mentoring scheme to include non-clinical scientists and we hope that this will provide a large measure of professional guidance and support.

General and emerging issues

4.17 We identified a number of issues that currently have a negative impact on research fellowship schemes, or may do so in the future.

- At present, the assessment of fellows in the RAE, and the pattern of Higher Education Funding Council of England (HEFCE) funding of fellows post-RAE, are important issues that inhibit the spread of good practice in the management of these researchers' careers.
- The lack of connectivity of many of the fellows to the UK biomedical industry, and the lack of appeal of industry as a career, is also a critical issue that requires urgent action.
- Three items - the introduction of fEC of research activity, EU employment directives and university strategies for use of the Office of Science and Technology (OST) Academic Fellowships programme - have direct implications for fellowship schemes.
- The training and development of both UK PhD students and post-doctoral fellows will be vital to ensure that individuals entering fellowships have appropriate skills and experience.

4.18 These and other factors suggest that the pattern of the UK pyramid of individual research fellowship awards needs to be assessed, and some account taken of the new circumstances in order to ensure a meaningful sustainability of this resource. There are additional problems relating to the status and remuneration of the non-clinical biomedical researcher, in comparison with clinical research fellows. Not only is there the question of the personal reward differentiation, but there are also fewer opportunities for non-clinical biomedical researchers to obtain funding for international meetings. The advance of modern clinical science requires strong partnership between non-clinical biomedical scientists and clinician scientists. If such a team is to flourish, we continually need to check that equal emphasis is being given to the sustainability of both sectors.⁴

⁴ This issue was covered in more depth in the Academy report 'Non-clinical scientists on short-term contracts in medical research'. February 2002.

Chapter five - *Analysis and recommendations*

Overview of fellowships

5.1 Fellowships are still perceived to be a mark of excellence and we observed no diminution in this view by funding agencies, applicants, institutions or fellows. However, our view is that some of the schemes are, or are likely to become, unfit for purpose in a fast-changing UK academic research system.

5.2 Examples of fellowship schemes are shown in Table 1. The statistics on applications and award numbers have been relatively constant over the last 5 years. There was some evidence that the number of research fellowships awarded by some of the other medical charities had fallen somewhat over this period. This table is not comprehensive but merely gives a snapshot comparison of applicant numbers and awards.

Table 1. Illustrations of fellowships, application and award numbers

Funding agency	Fellowship	Applications	Awards
BBSRC ¹	David Phillips	91	10
BBSRC ¹	Research Development	17	5
BBSRC ¹	Professorial	16	1 or 2
Wellcome Trust ²	Research Career Development	82	26
Wellcome Trust ²	Senior Basic Biomedical	95 preliminary, 32 full	8
Wellcome Trust ²	Principal Research Fellows	7	3
BHF ³	Basic Science Chairs & Lecturers	15	2
BHF ³	Intermediate Research	21	7
CR-UK ⁴	Career Development	20 preliminary, 11 full	2
CR-UK ⁴	Senior Cancer Research	27 preliminary, 11 full	2
Royal Society ⁵	University Research	350	45
Royal Society ⁵	Dorothy Hodgkin	250	14
Royal Society ⁵	Industry	25	8
MRC ⁶	Senior Non-Clinical	34	5
MRC ⁶	Career Development Awards	82	8

KEY: All data represents the numbers per year averaged over a particular period.

1 BBSRC data is the average of 2000-2003.

2 Wellcome Trust data is the average of 1993-2004 for Research Career Development Fellowships (14 new awards made in 2004), 1996-2004 for Senior Basic Biomedical Fellowships (6 new awards made in 2004) and 1988-2004 for Principal Research Fellowships (0 new awards made in 2004). Only eligible and appropriate applicants are invited to submit full applications. Figures do not include fellowship awards that were renewed.

3 BHF data is the average of 1989-2004.

4 CR-UK data is for 2003-2004 for Career Development Fellowships and for 2000-2004 for Senior Cancer Research Fellowships.

5 Royal Society data is the average of 1998-2004 for all science subjects.

6 MRC data is the average of 2001-2003.

5.3 We concluded that the funding of research fellowships in the non-clinical biomedicine area has had a beneficial effect on research quality in the UK, and we see a continuing need for such funding. We were, however, disappointed that some funding agencies appeared to have a poor grasp on:

- why they funded particular fellowship schemes
- why particular fellowship schemes were successful

5.4 There often appeared to be a view that it was self-evident that fellowships were a good thing.

5.5 We consider that the existence of a wide variety of fellowship schemes is beneficial to applicants and to the system. The UK is well served by having a diversity of funding agencies (in number, size and type) in the biomedical arena, each of which contributes to funding research fellows. However, we believe that individual funding agencies should consider building greater flexibility into their existing schemes, rather than developing new schemes with a focus that is virtually indistinguishable from what went before.

5.6 Some funding agencies inhibit applications to similar schemes offered by other funding agencies as a way of restricting applications, or to focus applications on a particular research topic. While we understand the reasons for such restrictions, there is a danger that if this practice were adopted by all agencies it would discourage applications, and diminish the UK's attractiveness as a place in which to conduct biomedical research.

5.7 **Conclusion:** the UK research community is best served by maintaining a diversity of research fellowship schemes funded by different funding agencies, even though some fellowship funding schemes need refinement and a greater definition of purpose.

Number and quality of applicants and fellows

5.8 Some individuals in our surveys argued simply for more fellowships, and for longer fellowships, as solutions to perceived problems. However, the focus groups tended to define quality of support as of greater importance. We found few strategic reasons for the number of fellowships presently funded within a particular funding agency's portfolio, with the explanations most often given being historical precedent and a view that 'it was about right'.

5.9 We believe that, in a constant funding situation, the numbers of fellowships should fall rather than the length of the award become less than 5 years, or that the associated funding becomes further restricted. There is likely to be continuing pressure on fellowship applications.

5.10 Postgraduate numbers in the biomedical sciences rose dramatically between 1996/97 and 2001/2, in contrast to those in other science and engineering subjects. Since 2002, numbers may have declined due to a decline in the number of funded studentships, especially from HEIs, but definitive numbers were not available to us.

Table 2. Percentage change in numbers of first year post-graduates, 1996/97 to 2001/2

Subject area	Total increase	Full-time increase	Part-time increase	Research degree increase	Taught degree
Biological sciences	44	38	57	30	54
Subjects allied to medicine	96	41	122	37	106
Physical sciences	-2	3	-21	-2	-1
Engineering and technology	13	14	13	11	14

Data from Times Higher Education Supplement/Higher Education Policy Institute Report. November 2004.

Changes in the size of the future 'feeder layer' for post-doctoral fellows, excluding applicants educated abroad, should be recognised.

5.11 **Conclusion:** funding agencies should concentrate on improving the quality of provision of their existing fellowship schemes, rather than increasing the number of places available. For targeted fellowships in specific disease areas or to build capacity, the numbers funded should be in accordance with long-term sustainability.

A better partnership between the three parties: fellow, funding agency and HEI

5.12 The identification of factors inhibitory to an effective relationship, and suggestions to improve the relationship, were a recurring theme in most of our discussions. This relationship worked extremely well in some institutions, for some fellows and for some fellowship schemes. However, we believe that:

- Fellowships should be viewed as a career opportunity and not as a career path (see also paragraph 5.29).
- There is a need for greater connectivity and a more constructive partnership between the institution and the fellow. This is particularly important in the planning of the exit of fellows from fellowship schemes.
- Greater clarity is needed in the responsibilities of the HEI to the funding agency. These responsibilities need to be clearer at the start of the fellowship. We are convinced that there is a current lack of clarity and, therefore, of responsibility in some cases, and much more could be done by all parties to improve this situation. However, the lead for change towards better partnerships should come from the funding agencies.

5.13 **Conclusion:** fellows and HEIs should view a fellowship as a career opportunity and not as a defined career path. Planning for the exit of the majority from the fellowship schemes should be a priority for individual fellows and HEIs.

Career development awards

5.14 Our analysis suggests that 3- or 4-year early career fellowships, often designed as the first fellowship obtained by a young scientist, are no longer fit for purpose even though they might enable a researcher to obtain a permanent academic position. This view was held by many of the fellows, university representatives and funding agency staff to whom we spoke. The nature and usefulness of these career development awards appears to have changed. A major issue (among others, such as restrictions on status and ability to hold other awards) is the short length of the fellowship, which precludes long term experimentation, sets an early deadline for career decision-making such as a move of institution, and requires often unsatisfactory arrangements in the HEIs for appointing research assistants and post-graduate students in the last half of the grant. We registered widespread dissatisfaction with these awards. Many would like to see their number fall, and their length increase. In developing our examples of good practice in fellowship programmes, we saw little need to differentiate between these fellowships and more senior ones, except in the award of differential resources to cover the core costs and grant component of the fellowship.

5.15 In the spirit of good practice and sustainability of a fellowship programme in a particular HEI, we believe that the HEI should be prepared to make some financial commitment to the individual fellowship programme. While we do not wish to be prescriptive about this commitment (which may differ with different agencies and fellowship types), with the 5-year major fellowships that we advocate, we believe that the commitment from the HEI should come in the form of a contribution towards the end of the fellowship. Ramped contributions, or contributions in a renewal period, are also useful approaches. We outline below two models (pages 30-31) for fellowship schemes that embody the move towards sustainability and connectivity together with some principles of good practice.

5.16 There is already evidence that a financial contribution to fellowship schemes can be

operated effectively. For 6 years, the Leverhulme Trust has provided an Early Career Fellowship scheme that funds 50% of a 2-year fellowship. This scheme, like so many of the Leverhulme Trust's activities, is open to applicants from any academic discipline. The trust has seen applications rise steadily, and receives an average of around 340 applications per year. In the last 2 years, applications have risen to over 450 per year. Each of these applications comes from an individual who has already gained the financial support of 50% of the potential funds from the HEI. This is a powerful demonstration of a cooperative fellowship partnership that has been successful for many award holders in terms of their research. These fellowships, although short, also have a very high success rate in enabling the holders to secure a tenured or long-term appointment.

- 5.17 **Conclusion:** we recommend that early career fellowships should be awarded for no less than 5 years, even if this means a reduction in the number of awards. Moreover, to stimulate HEI focus on sustainability, strategic 'fit' and the quality of the fellowships and individuals they are proposing to host, HEIs should make a financial commitment to the later stages of the fellowship.

Statistics within the funding agencies

- 5.18 We were disappointed to learn that some funding agencies had only partial records and statistics on their fellowship schemes. This undoubtedly makes comparative analysis of schemes rather difficult. Moreover, while some funding agencies had basic records of numbers in year groups, they did not appear to use these statistics in strategic planning or for committee assessment of the effectiveness of fellowships.
- 5.19 In our focus group discussions with fellows, we consistently found that they would strongly support publication of the statistics on applications/triage/awards made each year by a particular agency in a particular scheme. Fellows would find this useful when making decisions, both during the application process and after the award is made. We found few funding agencies

made these statistics available on the web, and many had never even considered doing so.

- 5.20 The fellows and the committee felt that this information was important, both in terms of openness, and in allowing applicants and institutions to make a realistic assessment of the schemes. The data should be maintained as a web-based, year-by-year table for each scheme. Some funding agencies argue that simple statistics might mislead, for instance, because applicants make applications to more than one agency, or that they might deter applications for particular schemes. We believe that each of these arguments can be dealt with, and that publication of a coherent, ongoing set of statistics is important. We commend the example of the Human Frontier Science Program (HFSP) annual report,⁵ which gives a >10 year history of applications/triage/award numbers with statistics on gender and geographical spread.
- 5.21 We deal with statistical information on progression, renewals and career track of earlier year groups in sections below. Compilation and publication of such historical information would be instrumental in creating a sense of openness.
- 5.22 If this information were available to all parties we believe it would lead to a more coherent partnership between the fellow, funding agency and HEI.
- 5.23 **Conclusion:** we recommend that all funding agencies should collect, and display on their web sites, statistics on numbers of applications and awards, together with gender information. Statistics on progression and renewal rates for fellowships in their portfolio should also be included. This information should be regularly reviewed within the agency. A consistent format would facilitate meta-analysis for the UK fellowship system as a whole, and contribute to a more strategic appraisal of fellowship schemes.

Progression and renewal of fellowships

- 5.24 There is much misunderstanding about the issue of progression from one fellowship to another,

5 <http://www.hfsp.org>

and of renewal of the same fellowship. Some funding agencies are very clear about the finite term of particular fellowships (BBSRC). Others (Wellcome Trust) accept progression and renewals for some schemes, while others (MRC) define the fellowship schemes as a career path. We understand that progression and renewal may be useful to funding agencies and fellows and can be very positive experiences. However, they also create problems of insecurity about alternative career decisions, and may influence HEIs to neglect good career planning and connectivity with their fellows.

5.25 We have a firm view that statistics on progression and renewal applications and success rates should be collected by all funding agencies and published on a year-by-year, cumulative basis. The absence of information in this area causes much misunderstanding and feeds bad practice. Progression does occur, but since many fewer senior fellowships are awarded than career development fellowships, and many fewer principal research fellowships than senior fellowships, the slope of the pyramid increases markedly with time. At every step, the likelihood of a particular fellow's successfully progressing to the next step is dramatically reduced.

5.26 As we recommend in 5.12 above, we believe that the award of a fellowship should be viewed as a career opportunity, and not as a career path (a career made up of a series of fellowships). When fellowships are viewed as an opportunity, the responsibilities of the fellow, funding agency and host institution become clearer. The best information we could obtain on this issue came from the Wellcome Trust, where 32 of the current 93 (34%) Senior Basic Biomedical Research Fellows (SBBRF) had previously held Research Career Development Fellowships (RCDFs). The success rate for progression over the years 1995-2003 varied from year to year between 0 and 83%, with around 8 SBBRF awards made per year. This no doubt emphasises the person-specific nature of progression, and the value of publishing cumulative, year-by-year statistics. In this period, during which 82 awards were made, there were 4 examples of RCDFs who had not only progressed to SBBRFs, but had also been through a renewal of the SBBRF award.

5.27 Around 200 senior personal awards (not including Principal Research Fellowships, PRFs) have been made by the Wellcome Trust since the launch of the PRF scheme in 1988. Of these, there have been 37 subsequent applications for a PRF, and 13 have been successful. To date, 50 PRFs have been awarded and taken up since 1988, and 6 PRFs have been renewed. Currently, there are 34 PRFs.

5.28 The figures above illustrate the progression that is possible within the fellowship schemes, particularly at the early to mid-career stage. However, given the numbers in each cohort, it is evident that progression is not available for the majority of fellows. Publication of appropriate and full statistics would ensure that both fellows and HEIs understood this important point.

Career expectations

5.29 We found that fellows were, in general, optimistic about their careers. However, we were often disappointed to hear that an academic position, such as a university lectureship/readership/professorship (depending upon the level of fellowship), was not regarded as an attractive prospect. This tendency to view an academic position negatively is unhealthy and would be of grave concern were it to become widespread. It appears to be a product of the lack of engagement between fellows and their HEIs, and is exacerbated by a lack of management in some HEIs over the control of teaching loads. We detected much more positive views of a move into an academic lectureship position in those departments with a coherent management structure and clear distribution of lecturing and administration loads for both fellows and permanent staff.

5.30 **Conclusion:** HEIs should develop better partnerships with their fellows to boost the appeal of an academic position. One way for HEIs to increase confidence in this career route would be through better management of research and teaching time for excellent researchers in HEI academic positions.

A career in industry?

5.31 We note, with regret, that few fellows see a career in industry as a goal. In fact, many stated that such an outcome at the end of their fellowship would be viewed as a failure. This is disturbing given that this cohort represents some of the best academic scientists in the UK. There are successful industry/academic short-term fellowship schemes, such as those run by the Royal Society, that fund small numbers of secondments. In October 2004, the BBSRC offered David Phillips Fellowships jointly funded with the British Pharmacology Society. We suggest that industry needs to ensure that its attractive career opportunities, and the kudos attached to them, are more widely appreciated in the fellowship community. In addition, we believe that some new form of partnership fellowship (the fellowship equivalent of a Cooperative Awards in Science and Engineering, or CASE, studentship scheme) should be investigated. It has been pointed out to us that, for those fellows seeking a research only career, industry is one way to achieve this. Furthermore, industrial positions are more likely to provide flexible working arrangements, including on-site childcare, than most academic posts.

5.32 Given the advanced and extensive research capabilities and technologies within industry, it seems likely that the UK is not maximising the potential of this partnership at the fellowship level. The bioscience industry should consider carefully the advantages that it could derive from more effective partnerships with those organisations currently offering fellowship schemes. In addition, given the new funding powers of the regional development agencies, we suggest that they consider assisting a fellowship programme that links translational biomedical research in HEIs with regional industries. Partnership fellowships may also be the way to strengthen links between HEIs and the research institutes run by research councils and major research charities, and to allow access to specialist facilities beyond the scope of individual HEIs.

5.33 **Conclusion:** Research councils and some charities should develop better connections with industry in their fellowship programmes. Industry also has a responsibility to target this

cohort of talented researchers, to ensure greater awareness of the careers open to them. We recommend that a new, co-funded fellowship programme in the biomedical sciences be developed by the regional development agencies and/or research councils, that would facilitate movement of talented scientists between HEIs and industry.

Career destinations

5.34 General statistics held by some funding agencies on the first career destinations after fellowships were poor. This we found surprising since, in their absence, it would appear difficult to assess the effectiveness of any scheme. A failure to obtain final reports from fellows (only 50% received), and a lack of analysis of these by one research council, seems not to be best practice. A coordinated, agreed strategy on good statistics gathering would be useful and would create the databases for an informative meta-analysis of trends in the UK.

5.35 Certainly, many early career fellows do progress to university lectureships. In 1999, the Wellcome Trust examined the destinations of 66 RCDFs. 50% had taken up lectureships, 30% further fellowships and 20% were in some other activity. The BBSRC has conducted a survey over a 5-year period of their David Phillips Fellows. 11 had obtained permanent academic posts in the UK, 2 had such a post overseas, 2 had fixed term appointments and 2 were in further training. As with the Wellcome Trust analysis, this appears to indicate a successful scheme that achieves one of its intended aims, which is to enable manoeuvring of young staff into academic positions. Interestingly, of the 14 who left their 5-year David Phillips Fellowship early, 6 had obtained permanent academic appointments overseas, 1 had moved to industry and 2 to longer-term fellowships (Royal Society University Research Fellowships, URFs).

5.36 **Conclusion:** we recommend that final reports on individual fellowships should be obtained and analysed by the funding agencies. They should collect, maintain and publish agreed data sets on the career destinations of fellows. Groups such as RCUK, AMRC and the Funder's Forum could usefully coordinate

agreement on a basic template of the metrics to be collected, and then publish period overview analyses for the UK.

facilities are considered, requiring a candidate to move to qualify for a fellowship application may not always be desirable.

Mobility and gender

5.37 Fellows had strong views on the need to balance differing factors in the mobility debate. Most fellows had experience in a number of places. The ability to move a fellowship appears to be valuable, and does facilitate the securing of a permanent academic position. Mobility in the early scientific career is also seen as valuable. However, the UK has many attractions as a place for doing biomedical training: for example, over 30% of Marie Curie Fellowships are held in the UK. A world class UK department will therefore often provide more exposure to international scientists and international networking opportunities than many USA or continental European departments. So even before issues such as children's schooling, partner's career or the need to maintain particular equipment and

5.38 Fellows do move their fellowships, however. Analysis showed that 43 MRC Fellows transferred their Fellowships during the years 2000-2004, out of the total cohort of 487 Fellows⁶ who started in this period. Flexibility of fellowship arrangements is also important to allow for maternity and paternity leave. The importance of this issue can be gauged from an analysis of MRC Fellows. 25 female Fellows requested maternity leave from their Fellowships during the years 2000-2004, out of the total cohort of 487 who started in this period. We estimate that this was likely to represent 25 out of around 200 female Fellows, or around 12%.

5.39 Biomedical science has an increasing proportion of women scientists and all funding agencies track these trends. The following statistics illustrate the distributions:

Of 26 RCDF awards made by the Wellcome Trust in 1998/99, 12 went to women and their average age at application was 33, very similar to that of their male (32) counterparts.

In 2002-3 the cohort of BBSRC Fellows had the following gender split:

	Male	Female
David Phillips	23	7
Research Development	14	6
Professorial	3	3

For Royal Society Fellowships, which cover all areas of science (there is known to be a poorer representation of women in the physical sciences), the averages for applications and awards per year for the period 1998-2004 were:

	Applications		Awards	
	Male	Female	Male	Female
University Research	267	88	34	11
Dorothy Hodgkin	64	189	1	13
Industry	20	3	7	2

For MRC Fellowships, the applications and awards averages per year for the period 1998-2004 were:

	Applications		Awards	
	Male	Female	Male	Female
Senior Non-Clinical	23	11	4	1
Career Development Award	52	31	4	4

⁶ This figure represents the whole cohort of MRC fellows, clinical and non-clinical.

5.40 **Conclusion:** flexibility in the use of a fellowship, and mobility after the award of a fellowship, is valuable and should be embedded in the initial conditions of the fellowship.

Geographical distribution

5.41 The geographical distribution of fellows in the UK has particular influences, outcomes and challenges associated with it. The distribution is reasonably even, when one considers the number of institutions. However, there are concentrations of fellows in particular cities and regions. Some examples are:

- The 53 current MRC Career Development Award holders have their fellowships in 23 different HEIs, of which the top 5 are UCL (7), Cambridge (5), Kings College London (3), Edinburgh (3) and Birmingham (3).
- The 39 current MRC Senior Non-Clinical Research Fellows hold their fellowships in 18 different HEIs, of which the top 5 are UCL (7), Bristol (6), Cambridge (4), Oxford (3) and The Babraham Institute (3).
- The Wellcome Trust's 93 current SBBRFs are also spread widely, among 21 institutions. However, there are concentrations. The golden triangle of Oxford, London and Cambridge claims 51 of the fellows, Edinburgh and Dundee have a cluster of 18 and Manchester has the next largest concentration.
- The Wellcome Trust's current cohort of 34 PRFs is more heavily concentrated. 25 are located in the Oxford/London/Cambridge triangle and 8 in Edinburgh/Dundee. Some of this clustering is a consequence of the location of the Wellcome Trust Centres and, in fact, the 2 PRFs located outside the above areas are in the Wellcome Trust Centres in Manchester and Glasgow.

5.42 This geographical spread reflects the natural clustering of researchers in centres of excellence, as well as associations of fellows with existing centres or units embedded within universities. Given the number of the fellows we spoke to who have partners in science, medicine or another academic area, geographical clustering also

seems to be driven by the rich employment opportunities offered by certain UK regions. While all HEIs receiving fellows have a responsibility to maintain an interest in their careers, and to adopt good HR practices, that responsibility is clearly greater in universities with relatively high concentrations of fellows. Our understanding is that some fellows have a good relationship with the HEI and others do not.

5.43 'Rationing' the numbers of fellows in HEIs is not the answer. However, further pressure should be placed on some institutions to adopt the superior HR practices operated by others. A financial commitment to the fellowship as described in our example of good practice (*Appendix 1*) would be useful in changing attitudes and creating sustainability. In addition, improvement in the mentoring, review and appraisal systems available to fellows would improve the situation in some of these HEIs.

5.44 Fellows recognise that a period spent in these research-intensive centres can be productive and useful for their careers. Furthermore, there is widespread acknowledgement that a good proportion of the fellows who spend time in these centres are unlikely to obtain permanent academic positions there. Greater transparency in relation to career opportunities within certain HEIs would help make the exit from them a more positive experience for fellows who are not offered permanent positions. Indecision through bad management creates particular difficulties for fellows in terms of career opportunities. However, fellows also need to be clear about the likely opportunities at key stages of their career, so that they may act appropriately.

5.45 **Conclusion:** HEIs should aim for clarity in the terms of the fellowship agreement from the outset. There should be transparency in the matter of career opportunities available to fellows, and mentoring and appraisal should be provided either by the funding agency, host HEI or preferably both. Fellows, for their part, must assume responsibility for their own career planning, and should be willing to undertake some (limited) activities to support the host HEI and to develop teaching and

management skills that may be useful to them in their future careers. Experience of communicating science to the general public would also be beneficial.

EU employment directive

5.46 We believe that all holders of personal fellowships should submit a yearly report to the funder with comment from the host HEI. Some funding agencies demand this, review the reports both in the secretariat and in the awarding committees and respond appropriately. Others have no way of feeding back information to the awarding committee on the outcomes of their decisions. We believe that such a cycle of information is important. We were impressed by funding agencies which held yearly meetings of fellows and used these as an opportunity for mentoring and appraisal by external scientists and members of the awarding committees.

5.47 We found wide variation in the degree of engagement of HEIs and/or departments with EU employment directive regulations on staff contracts. Many fellows were unaware of the implications of these employment changes in their HEIs, and most funding agencies had no plans to address issues concerning fellowship contracts, such as redundancy costs. This was partly due to the almost complete absence of a yearly appraisal meeting for fellows in many HEIs, even though the HR departments often professed that appraisal schemes were in place. The absence of an appraisal system could potentially create problems in the event of a dispute over contracts.

Full economic costing

5.48 The implications of the forthcoming fEC of grants by government did not appear to have been addressed in detail by any funding agency in relation to fellowship schemes, though we accept that this is an area of rapid change and development and funding agencies may now be turning their attention to it. There are a series of issues to be addressed here:

- If the salary of fellows continues to be met by research councils, how will the fEC flow with

that grant? How will subsequent grants held by the fellow be funded to exclude double counting?

- What will be the effect of fEC sustainability on fellowships such as the Royal Society URFs, which give a fixed costs grant?

5.49 Under the initial fEC rules, the research councils will fund 80% of the total costs (this will take into account estates and services, and indirect costs), so that any institution applying to support a fellowship must agree to meet the remaining 20% of costs. This raises a number of issues. Might HEIs identify research-intensive staff, and seek to recover 100% of the researcher's salary (80% of the total costs), if the researcher's time is released to be dedicated to that project, while the HEI still receives these salary funds from HEFCE? This could provide interesting scope for the universities to use these new funds in different ways. Questions then arise as to whether the fEC system negates the need for certain mid-career break or career development fellowships, or only makes it worthwhile for certain types of academic to apply for them.

5.50 All funding systems influence behaviour of HEIs, departments and individuals. The change to fEC rules provides some positive opportunities for fellowships and some threats. If one outcome was to introduce realistic research positions (readers and research professorships) in academic departments, where a major portion of a person's time would be devoted to research rather than to administration or teaching, then this could provide an ideal opportunity for research fellows at the end of their fellowships. That in turn would encourage better management partnerships between research councils and HEIs. We note that imaginative use of fEC in the years to come may render research-leave fellowships obsolete.

5.51 **Conclusion:** HEIs should develop a defined policy for fellows based on EU employment directives. Plans for full economic costing (fEC) of fellowship grants should be carefully considered to facilitate individual research career opportunities for fellowship holders and active Higher Education Funding Council (HEFC) funded researchers.

The Research Assessment Exercise

5.52 The RAE and the HEFCE research funding patterns have a negative effect on research fellows in England. Many research fellows funded by the best peer-reviewed agencies in the country were excluded from RAE 2000 and subsequent RAEs. Although they are assessed as a unit of 1.0 in the assessment part of RAE (that is, equivalent to a permanent member of staff), they are treated as 0.1 of a unit when it comes to the funds that flow to a HEI - and hence to a department - from HEFCE. This had a pernicious effect on submissions to RAE 2000 and on how individual fellows are treated within departments and HEIs. Many young fellows were left out of submissions.

5.53 Most English biomedical HEIs calculated, perfectly logically, that unless one could judge that the fellow was clearly of international stature (something that is difficult to do with younger academics), then the risks to the grading (where all staff entered are assessed by the same criteria) vastly outweighed the possible financial benefits that might accrue in the funding. Many research fellows were therefore not included in the RAE. This did not happen in Scotland because of the different funding pattern there.

5.54 A change in this pattern of assessment and funding would have a very positive effect on the status of biomedical research fellows in the HEIs. It would mean that the next RAE produced a more realistic assessment of the UK's strengths in biomedical research, and it would be a driver for sustainability of the intellectual infrastructure of UK academic research. HEIs should be encouraged to submit all independent research fellows to RAE 2008, in the knowledge that they will be assessed appropriately, and then funded in the same way as other Category A staff.

5.55 **Conclusion:** we recommend that research fellows who hold an externally peer-reviewed independent research fellowship should be (a) included in the 2008 RAE submission and (b) included in the subsequent funding model. In this context, they should be treated as the equivalent of HEFC academic staff members.

Research Councils UK (RCUK) Academic Fellowships

5.56 Launched by RCUK and the OST following the Roberts' Review, this scheme has the laudable ambition of easing progression, and increasing security, within research careers. The scheme will fund 1000 Fellowships in all disciplines over 5 years in the first instance. In September 2004, 398 were awarded to 73 HEIs for the first 2 years of the scheme. Perhaps not surprisingly, a substantial fraction of these Fellowships were awarded for non-clinical biomedical scientists working in areas categorised by the OST as 'medicine', 'life sciences' and 'interdisciplinary'. There are well-established issues concerning the implementation of this scheme that could hamper its ambition. One is the fact that many of the applications in the biomedical sciences will focus on similar areas of activity. Another is that considerably less than 50% of FEC of these posts is met by the funding from OST. A full analysis of those appointed to this first tranche of fellowships in a few years' time will be important. So far this scheme appears to have had little effect on applications to the established fellowship schemes, but it is probably too early to draw any useful conclusions about that. If the scheme should suddenly cease so that no more fellowships were awarded after the first 5 years, that would undoubtedly add to the difficulties faced by early career biomedical scientists in finding tenured positions, and would add to the pressure on other fellowship schemes.

7 *The Wellcome Trust has recently announced changes to its Senior Research Fellowships in Basic Biomedical Science that are in accord with many recommendations that we make. The changes include an announcement that renewals of this form of fellowship will be competitive and will be funded on a 50:50 partnership basis with the host HEI for the full renewal period. The research costs have been unlinked for the renewal period and the Wellcome Trust will continue to pay these costs in full, as per the models we suggest. The HEI will be required to guarantee at the outset that it will support renewal of the award on this shared basis. This form of funding embodies many elements of our recommendations in terms of more effective funding partnerships, clarity of relationship with HEI and awardee at the outset and specific points for assessment of a competitive renewal. We welcome this initiative.*

Models of best practice in early career fellowship schemes⁷

5.57 In this report we have made a set of general recommendations that we believe would improve present fellowship schemes and ensure they are more fit for purpose. We conclude with two model schemes that put our recommendations into practice for early career fellowship schemes. These are designed to allow our most promising young biomedical scientists to develop as world-class independent researchers. Such fellowships should be embarked upon after 2-6 years of post-doctoral experience. As we have emphasised, they should be of at least 5 years in length.

5.58 We incorporate into one demonstration schema the opportunity for the fellowship to fit one of the following:

- a 5-6 year scheme, determined from the outset
- a 5-6 year scheme but with the possibility of renewal
- a 10 year scheme from the outset with a mid-term review.

5.59 This demonstration template has been formulated to address issues of:

- clarity of length, assessment points and commitments from the outset
- a length of independent research time fit for modern approaches in biomedical research
- a structure with built-in flexibility
- a structure that effectively engages the fellow with the HEI's and the funding agency's policies, financial support and forward strategies from the outset.

Model 1. Funding partnership between HEI and funding agency

5.60 The establishment of a working relationship, and an understanding, between the HEI and the funding agency over milestones in the award and the responsibilities of each partner is critical. If the fellowship does not require a firm commitment from the HEI to deliver a permanent contract for the holder at the end of

the fellowship, then we believe that a scheme where the HEI commits some funds to the latter period of the fellowship is the best plan. We recommend that many fellowships should move to this model.

We recommend that awards be made in two parts, A and B.

Part A would provide the fellow's salary and minimal running ('core') costs sufficient to allow the fellow to continue experiments (currently around £15,000 p.a.). For funding agencies with no, or limited, grant schemes this may represent the full fellowship (as in the case of the present Royal Society URFs).

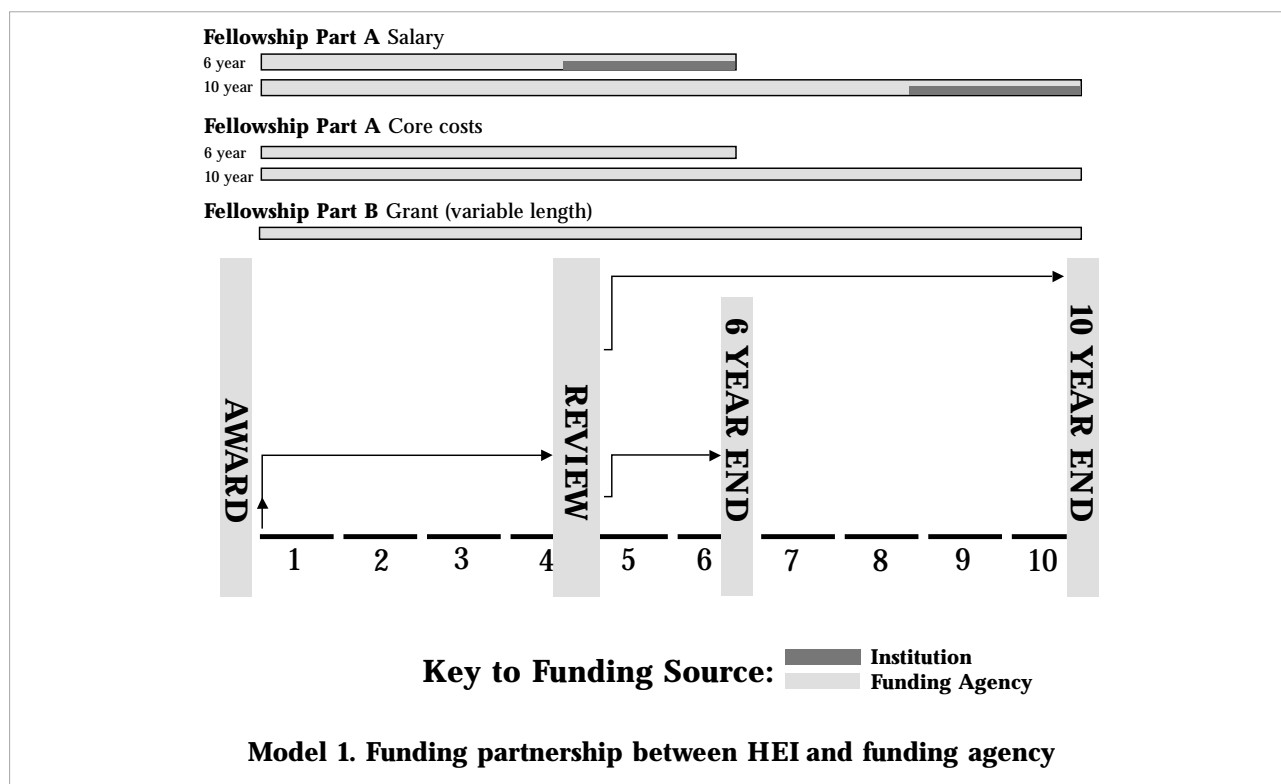
Part B would take the form of a competitive research grant, providing funding and running costs for other personnel and equipment. This could be of variable length and size, depending on the fellow's work plan, capabilities and stage of career, and range from a 3-year, project-like grant, providing a technician or research assistant, to a full programme-like grant funding multiple positions for 5 years. There should be sufficient flexibility, such that modifications to the funding are possible over the lifetime of the fellowship. Thus, rather than accumulating a set of diverse project grants, fellows should have a coherent portfolio of funding provided by their main funding agency. We have split the funding into two parts to separate the fellow's salary from other aspects of financial support. The initial portion of the Part B funding, which represents the grant costs, must be awarded along with the fellowship at the outset. We separate it in our scheme so that length and size of grant funding should be flexible and may be modified throughout the fellowship period as the research progresses or the fellow becomes more established.

5.61 The scheme set out in Model 1 illustrates how the funding and decision points might best be arranged. The key aspects are as follows:

- The fellowship is for 6 years in the first instance, but can be extended or renewed for a maximum of 10 years.

- The HEI agrees at the start of the fellowship to fund 50% of the salary costs of the fellowship in years 5 and 6 if the fellowship is not extended or renewed. If the fellowship is extended or renewed, then the HEI agrees to fund 50% of the salary costs in years 9 and 10, or ideally a tenured appointment.
- The review period is agreed by all parties at the outset to start at a defined date in late year 4, with a decision at the end of year 4 as to whether the fellowship is to be extended or renewed. There should be a history of appraisal within these first 4 years. If the outcome of the review is that the award will not be extended, then the salary funding for years 5 and 6 is shared by the funding agency and the HEI. An important feature of this model is that in these circumstances, the fellow has 2 years of full funding in which to find further employment.

5.62 We would emphasise that this model ensures clarity in terms of responsibilities and decision points. An upfront, co-funding commitment from the HEI places greater pressure on it to mentor, appraise and support the fellow, and it places an increased responsibility on the fellow to contribute more widely within the HEI and so gain a greater skills and knowledge base over the fellowship period. It introduces transparent milestones and deadlines, and should also drive a sustainable plan within the HEI and/or department cost centre for managing the portfolio of fellowships. It is fully compatible with EU employment directives and adaptable to fEC. More advanced schemes such as those represented by professorial/principal fellowship schemes are considered to be important and should be maintained. These may provide the continued career for a few of the 10-year fellows emerging from the above scheme, or may be awarded at other points in researchers' careers for specific reasons.

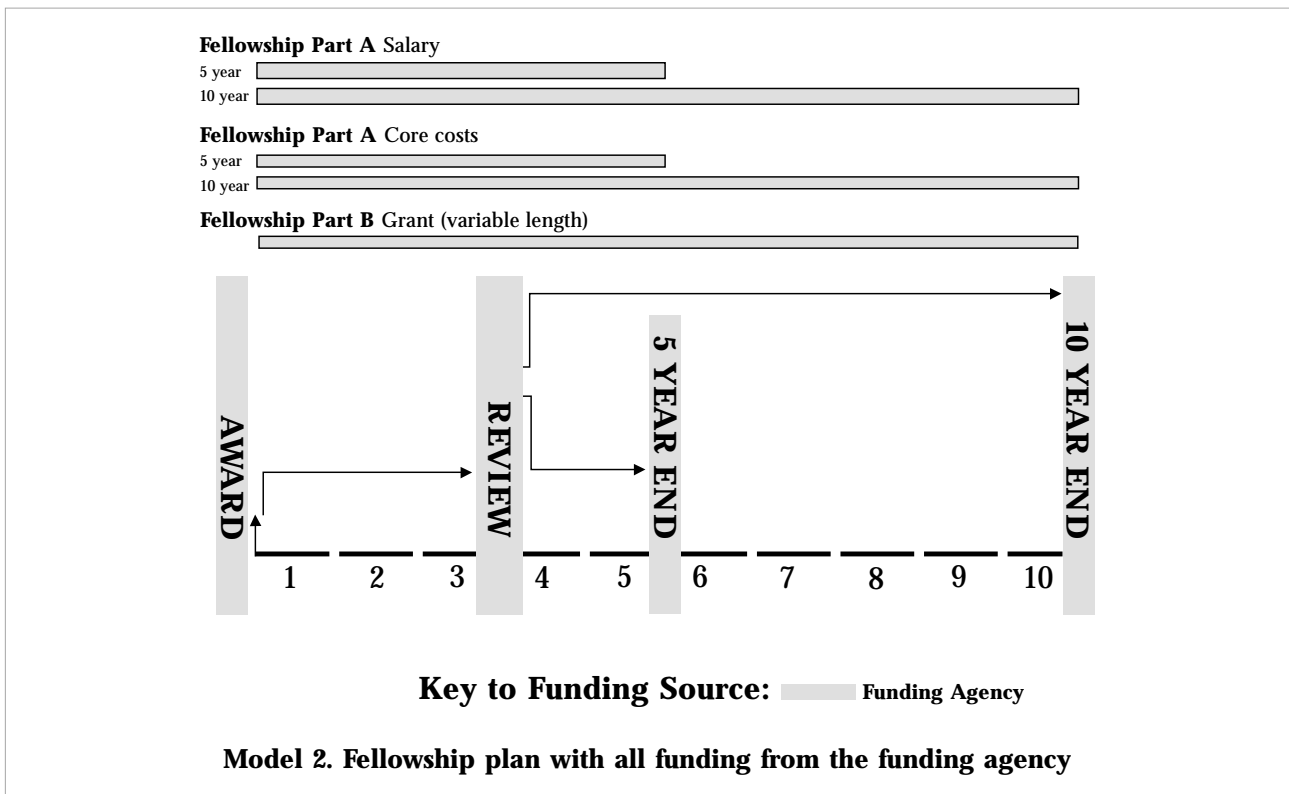


Model 2. Fellowship plan with all funding from the funding agency

5.63 We firmly believe that the HEI should make some commitment to a fellowship plan that involves salary, core support for the fellow and a separate grant coming from the funding agency, as in Model 1. In cases where the funding agency decides not to ask for this commitment, then we believe best practice dictates Model 2 (Figure 2), where the agreed review point is late in year 3 with a decision point on whether there is to be an extension at the start of year 4 (again, giving the fellow whose fellowship is not being extended close to 2 years to find his or her next appointment).

Renewals and extensions

- 5.64 All renewals should be competitive with new awards.
- 5.65 Models that use the concept of an extension to the fellowship rather than a renewal of the fellowship have much to commend them.
- 5.66 Publication of statistics will facilitate an informed view of the likelihood of an extension or renewal, as mentioned elsewhere.
- 5.67 In relation to this type of model and on the issue of extensions to fellowships, we noted that CR-UK awards fellowships competitively to both HEIs and their own Institutes out of a fellowship budget. Fellows in HEIs can apply for renewals and this is dealt with as a competitive renewal. However, in the event of a fellow working in one of the CR-UK Institutes wishing to renew, then this is only possible if the fellow is supported by the Institute Director and the latter agrees to pay for the renewal out of the Institute's baseline funds. This appears to be an excellent example of good practice in an agency which has fellows in HEIs as well as in their own institutes.



Appendix 1 - *Focus group reports*

In 2004 we held focus group meetings with cohorts of 65 research fellows from 9 HEIs: the Universities of Aberdeen, Bristol, Cambridge, Dundee, Edinburgh, Manchester, Oxford, Sheffield and Sussex.

The following discussion topics were used in the focus groups as possible areas, or questions, to explore with the fellows (not in any order of importance):

- Why this career route?
- In retrospect, was the fellowship the right career move?
- Is the fellow involved in any teaching, administration or management, and has any formal training been provided?
- What are the long-term career aspirations of the fellow and what does he/she want to do next?
- Does the fellow consider him/herself to be a suitable candidate for work in industry?
- How important is tenure?
- What was his/her previous experience?
- Did he/she move from another institution? From abroad?
- Does the fellow feel under pressure to move between institutions?
- If with a partner, are there 'partner employment issues' in the debate over career track?
- Can the fellow provide any personal information about his/her work-life balance (partner's career, mortgage, children)?
- Does the fellow have an expectation that their career will work out all right?
- How important is salary?
- How important is support and security?
- What are his/her expectations in relation to the various fellowship schemes?
- Has the institution handled the fellowship well, both at department and at university level?
- Has he/she had any formal career advice?

- Does he/she get a formal yearly appraisal?
- If he/she has taught, what level was this at and how much?
- Does he/she feel in contact with the funding agency?
- Is the funding agency providing all the requisites for his/her research? Is the provision of running money and research assistance adequate?
- What would make his/her fellowship better and more effective?
- What generic issues can he/she identify that we should take into account in our investigation?
- What more could the funding agency do to improve the fellowship and his/her experience and career plans?
- What more could the host institution do to improve the fellowship and his/her experience and career plans?
- What are the good aspects of the fellowship, that should be preserved and enhanced?
- What, if any, are the disadvantages of holding a fellowship?

At least 7 fellows were involved in each focus group's analysis of the issues confronting fellowship holders. The fellows covered the full range of age, experience and seniority of fellowship type. Many fellows had moved between institutions, some were educated abroad and had been attracted to the UK by the fellowship schemes. A number also had partners in science and there was a good gender balance. We found the fellows to be well informed about the relevant schemes, and many offered the view that the independence of our review, and the generic issues being addressed, enabled a more open analysis of their HEIs, their funding agencies and themselves.

In total we interviewed 65 fellows holding the following types of fellowships, which span the

research councils and medical charities and include a few (3) named university fellowships:

Royal Society University Research Fellowship
Royal Society Dorothy Hodgkin Fellowship
MRC Career Development Fellowship
MRC Senior Research Fellowship
BBSRC David Phillips Fellowship
Wellcome Trust Research Career Development Fellowship
Wellcome Trust Training Fellowship
Wellcome Trust Senior Basic Biomedical Research Fellowship
Wellcome Trust Principal Research Fellowship
BHF Fellowship
Lister Fellowship
CR-UK Career Development Fellowship
Named university fellowships

Summary of findings from focus groups

Strengths of fellowship schemes

Fellowship schemes were seen as a superb opportunity for a protected research period to set up one's own laboratory and to compete internationally. Fellows often used phrases such as 'an opportunity to do world class research' or 'the freedom to succeed'.

Views about the prestige of such fellowships varied. Some thought that career development research fellowships were not very prestigious given their number; others viewed fellowships at all levels as highly prestigious.

Fellows valued flexibility in use of funds, mobility of fellowships within the UK and the possibility of renewal. A safety net, in the event of fellowships not being renewed, was important to them.

Opinions over salaries varied. All agreed that UK academic salaries are generally seen to be poor (and particularly so in Oxford and Cambridge), and hence inhibit the transfer of staff from particular parts of the UK (due to mortgage issues) or from abroad (where salaries tend to be more competitive). The enhancement of salaries by the Wellcome Trust provided its fellows with a sense of self-worth, particularly when the salaries

were compared to those of nearby, clinically qualified scientists. Such enhanced funding is important for fellows coming from abroad. Host institutions did not generally attempt to moderate the salary scales defined by the Wellcome Trust, but instances were reported to us in which the fellow was not allowed to accept some other fellowships' full salary, since this was outside that particular university's agreed pay scale. One difficulty is that few universities have been able to match the higher salaries offered by some funding agencies, and many fellows faced a reduction in salary at the end of their fellowships.

The length of the fellowship, and the manner and timing of any renewal, were major issues. There was a unanimous view that the career development fellowship or early career fellowship forms of funding, lasting 3 or 4 years, were inadequate and no longer fit for purpose (in terms of length, independence and ability to recruit and retain staff). Some fellows even expressed the view that they 'encouraged a short-term view of research and discouraged long term thinking'. A 5-year duration would make the award more attractive, more productive and lead to more positive outcomes. Holders of senior fellowships thought that the 5-year periods were appropriate, and considered the opportunity for renewal a positive feature. However, at the end of the second term, future prospects were described as 'grim'. The possibility of being awarded a principal or professorial fellowship, or some further fellowship, now appeared remote to them, although most fellows considered that historically, this was a pathway for a reasonable number of researchers. The pyramid structure of some fellowship schemes was recognised as inevitable, but the present arrangements had created a bottleneck of researchers with restricted options. Royal Society Fellows felt that the potential longer term of their fellowship was more realistic in terms of career planning. In this context, fellows consistently stressed or emphasised the difficulties of managing the final part of their fellowships. More flexible, 'sunset' arrangements were needed.

Release from teaching and administration was viewed as a considerable bonus and was a recurring theme. The issue of the teaching

burden was felt most strongly in universities such as Oxford and Cambridge which lack unified departmental and/or divisional control of the teaching load. Many fellows expressed willingness to teach more if they could be assured of coherent teaching management within their university and if, in return, they were given appropriate status and opportunity within the university system.

All fellows, even those with early career fellowships, felt that they were already independent researchers. All wanted to continue as research-intensive staff, and would only move into an academic position if it was attractive, and usually after all other avenues had failed. Virtually all participants wanted to remain within an academic environment.

In retrospect, virtually all fellows believed that the fellowship had been the right career move, even though problems were identified with some of the fellowship schemes, and there was concern about overall job security.

Comparisons between schemes

The group format of the discussions allowed us to gather some of the fellows' perceptions of the various schemes, and to make comparisons between them. A number of points emerged from such comparisons:

- *Contact with the funding agency:* the Wellcome Trust maintains contact through meetings and personal contact with staff running the schemes. BBSRC Fellows also had useful contact through meetings and assessments, while MRC Fellows had little contact. Royal Society Fellows had very variable responses to this issue. Small-scale annual meetings of fellows on similar types of fellowship (with past fellows) were felt to be useful.
- *Selection of candidates:* the Wellcome Trust and MRC interview candidates, but the Royal Society does not. Fellows felt that this difference in approach was good and allowed selection of different types of candidates. Most fellows agreed that the form of interview, and the collective expertise of the interview panel, were good at the Wellcome Trust and BBSRC but less so at the MRC. Preliminary application forms were

regarded as very useful in focusing the overall aims of the project, and ensuring appropriateness within the remit of the funding agency. The short Royal Society application was liked and considered appropriate since the fellowship mainly funds the individual.

- *Running costs:* most fellowships provide some support, but the Royal Society does not fully fund laboratory running costs or associated staff. This was set against the fact that these fellowships were potentially renewable (with a high success rate), and one comment was that this form of support could be 'regarded as a valuable preparation for the real world'. In contrast, the support provided by most other schemes was regarded as critical for specialist equipment provision and speed of start-up.

Relationships with the host department and institution

We analysed the views of the 65 fellows interviewed and found large variations in the relationship that fellows enjoy with their host HEI. This variation has little to do with the seniority of the fellowship held. Rather, it is a difference between HEIs in their treatment of the same type of fellowship. In universities where the pre-clinical and clinical biomedical sciences are organised in smaller departments, these differences sometimes existed within the same university and were not unified by higher structures (divisions and/or schools) within those universities. In essence, only in some HEIs were fellows treated as full academic staff. It is important to note that this pattern of treatment was independent of differences in funding of fellows by HEFCE and Scottish Higher Education Funding Council (SHEFC), as we found examples of good practice in both Scotland and England.

The following varied enormously between departments or institutions, from being entirely absent, to being present in a transparent, well-structured form:

- induction to university
- space, refurbishment and maintenance support
- training for teaching
- mentoring

- career advice
- inclusion in departmental meetings
- access to research students and internal funds
- clarity of promises from the host department when sponsoring the application
- status: some fellows are treated as full academic members of department while others are treated like post-doctoral researchers
- teaching expectations
- appraisal and promotion
- definition of status (e.g. for purposes of external and internal examining of undergraduates, MScs and PhDs)

Many fellows from different universities were critical of the central university finance, administration and HR offices, many of which lacked an understanding of UK fellowship schemes and their status. This directly affected the fellows' ability to operate as principal investigators, and hence curtailed their independence. In addition, we heard of large differences in the treatment of individuals whose fellowships were explicitly given to relieve them of normal duties and a new parallel position funded (e.g. Lister Fellowships). Some HEIs honoured these conditions and some did not.

Fellows raised the issue of their 'returnability' for the RAE, although many had no idea of the details. Some had been informed that they could not be 'returned' in the exercise as they were not HEFCE-funded.

Relationships with the funding agency

The level and effectiveness of contact varied enormously and no doubt was a reflection of both the particular funder and the fellow. Those in receipt of Wellcome Trust Fellowships were particularly complimentary about its commitment to its fellows. It was stated that the Trust was very efficient in response to any queries and ready to give advice and help where necessary. Those that attended the annual meetings found them very useful. The MRC was seen as 'relatively helpful', although a recent high staff turnover had caused some problems. Provisions made for fellows to contact the funder

were variable. Dedicated email contact with the MRC was thought by many to be unsatisfactory. The Royal Society has a website, a newsletter and meetings but does not provide a mentoring scheme.

Some fellows had provided annual reports that were considered at committee meetings, and had received feedback (e.g. BBSRC Fellows). Other fellowships required reports but provided no feedback to fellow or host department, and some fellows were only required to give a final report (e.g. Wellcome Trust Training Fellows). There was an almost universal feeling that feedback is, or would have been, very helpful.

MRC annual reports were a useful exercise for the fellow and helped shape future research ideas. The Wellcome Trust Senior Fellow annual report was seen as much less arduous but still useful and necessary. The lack of detailed justification required by the Wellcome Trust on issues such as spending was welcomed. CR-UK Fellows felt that the office had a good knowledge of them and their fellowship plans and activities.

Contact with other fellows was useful. The BBSRC and the Wellcome Trust provide useful annual meetings for fellows. The Lister Institute of Preventive Medicine was highly praised, providing annual meetings for both current and past fellows, together with an annual visit from the secretary to discuss progress.

The character of the person in the secretariat running the personal awards was a major influence on the success of schemes. Frequent changes of personnel in that role, for whatever reason, had a powerful negative effect on communication and confidence.

Career expectations

Most fellows were optimistic about their career prospects, even those in HEIs that offered them little hope of a guaranteed post. Most were optimistic about getting a job if their research was productive, although they recognised that this might involve moving institution. However, a university lectureship was often stated as no longer being attractive at the end of a fellowship. Again, discrepancies between university and

certain fellowship pay scales became a real issue by the end of a fellowship.

A small group of more mature fellows - often, though not exclusively, working in certain Cambridge and Oxford departments - were more demoralised and frustrated about their career expectations. They were delighted by their funding and colleagues, but found their inability to engage with the university over longer term planning depressing.

We noted that although all fellows were much exercised by the difficulties they might face, or are facing, at the end of their fellowship, they were largely ignorant of important issues such as EU employment directives. At the time of the focus groups, these issues did not appear to be discussed in many universities at a level that engaged those affected by them.

We specifically explored the possible career route offered by industry at the end of a fellowship. We found only one fellow who was even entertaining this as an option, and one other who had moved from industry to the fellowship. Essentially, the fellows aimed to continue working in an academic environment. Most had no contact with industry, although a few fellows felt that the skills acquired during a fellowship might be useful for industry, or for founding a company. This disappointing and worrying aspect of the career path of fellows is best summed up by a comment that 'landing a job in industry would be seen as a failure at the end of this fellowship'.

Mobility issues

Some funding agencies state explicitly that they prefer candidates to move in order to take up a fellowship, while others allow fellowships to be awarded in the same institution. The fellows appreciated that there are obvious benefits from changing environments, but had concerns that personal circumstances sometimes made this difficult (finding employment for a partner, or providing schooling for a young family, were issues for almost every fellow). It was felt that not wanting to move should not count against an applicant for a fellowship, and that the criteria for

awarding a fellowship should be based on scientific merit of the applicant and host environment. Some fellows felt that mobility criteria in the application process discriminated against scientist couples and those with children.

Suggestions as to how host institutions could improve fellowships

- Ensure clarity in sponsorship level at outset of application
- Be realistic about the number of fellows taken on, and make clear what the rules of appointment and support of renewal are at the outset
- Formally review expectations and commitments 2 years before the end of the fellowship
- Put in place a mechanism for dealing with recruitment of PhD students and submission of grant applications towards the end of the fellowship, to prevent fellows from having to wind down their research groups
- Adopt realistic salary scales that are internationally competitive
- Develop a scheme to facilitate the transition, after review, from a fellowship to a university post, with appropriate mechanisms for bridging gaps and levels in salary
- Develop a long-term strategy that allows connection and synergy between the research areas of fellows and the future likely teaching needs or strategic developments within the host HEI
- Underwrite 2 years' salary beyond the end of the fellowship
- View themselves as in partnership with the funder, and recognise fellowships as an important contribution to the career of the individual - not just as a contract salary
- Recognise fellows as a specific group that make an important contribution to the university
- Ensure that fellows are given the appropriate status
- Ensure that central services departments (finance, administration and HR) recognise the status of fellows
- Either formalise the appraisal scheme or abolish it

- Recognise and adhere to rules of the fellowship concerning teaching and administration loads.

Suggestions as to how funding bodies could improve fellowships

- Ensure consistency and transparency in pay scales between fellows
- Help to bring pressure on host HEIs to fulfil their obligations
- Allow salary components to be added to grants as in the USA. This would allow grants to supplement the difference between fellowship funding and university pay scales, making transfer to university posts easier
- Allow salaries to be added to programme grants, making 'rolling fellowships' a viable option
- Ensure that salary scales are independent and not subject to change by the host institution
- Fund individuals NOT sponsors, as funding of the latter leads to exploitation of schemes for glorified post-doctoral researchers
- Consider the length of some fellowships in relation to preclusion from departmental student schemes and grant applications, because of the possibility that the fellowship might finish before the studentship/grant
- If necessary, decrease the number of awards and increase the length to at least 5 years for those given to younger scientists
- Prevent fellows being restricted in their ability to build research groups by allowing other grant applications where appropriate
- Develop systems for dealing with applications from scientist couples
- Provide flexibility in grant fund spending, both in terms of timing in the fellowship period and virement between headings
- Build in some form of safety net to all personal awards at fellowship level
- Provide feedback on fellows' progress
- Provide clear guidance on expected maximum contribution to teaching and administration
- Remove the requirement to move between institutions
- Award fellowships on scientific merit and promise alone, but require input, even financial input, from the university
- Organise regular, small scale meetings of past and present fellows on similar types of fellowships
- Consider a mentoring scheme.

Appendix 2 - Meetings with funding agencies

After our initial meetings and consideration of the issues from the fellows' focus groups, we met representatives of a variety of funding agencies in 2004. We debated our preliminary conclusions, heard views on their fellowship schemes and how they were operated, and discussed any policy matters that they had under discussion. The agencies were the Wellcome Trust, BHF, MRC, BBSRC, CR-UK, AMRC and the Royal Society. We also contacted a number of other charities and funding agencies over specific issues.

Summary of findings from funding agency meetings

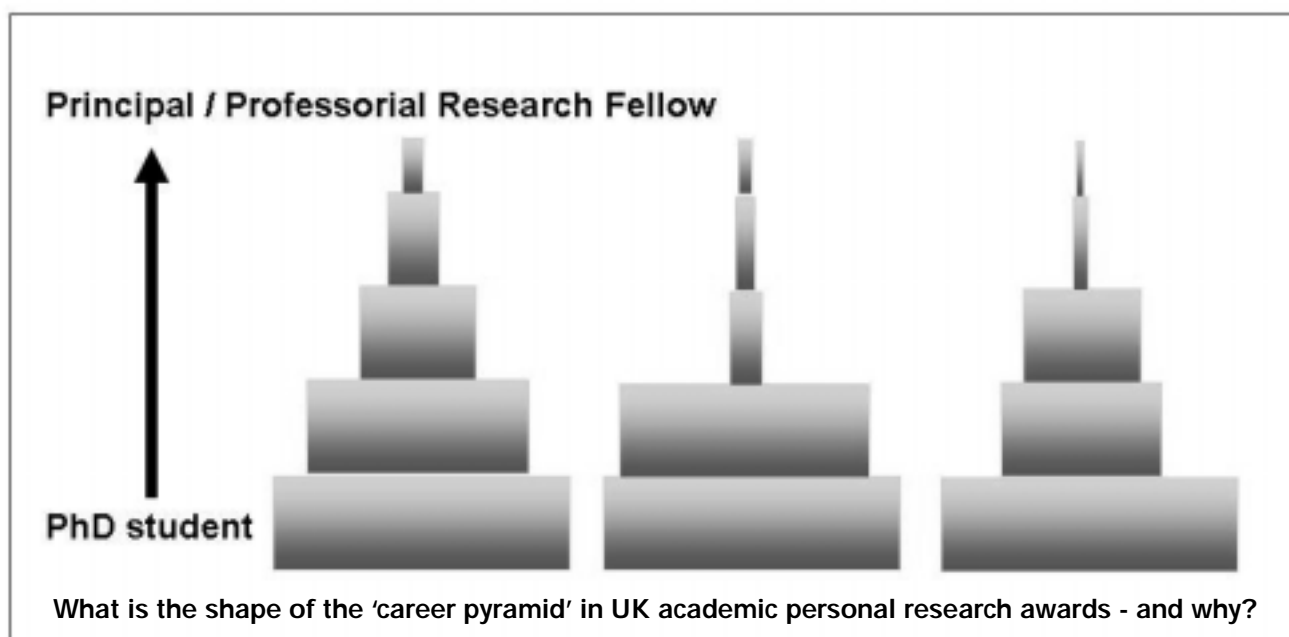
Fellowships in the context of career structures

The biomedical charities, research councils and the Royal Society fund a spectrum of personal awards at the postgraduate and post-doctoral levels, and at the three major levels of fellowships: early, mid- and late career. Smaller charities in the biomedical sector often concentrate on one of these activities - sometimes at the fellowship level. All funding agencies believed that their fellowships were highly prestigious and much valued.

We noted that while most of the funding agencies recognised there were alternative career paths from student to senior researcher, only a few appeared to have a holistic view of their individual funding schemes. Moreover, we were struck by the absence of an integrated view of the funding of individuals within the UK biomedical field. Given the importance of this research area to the UK academic and industrial infrastructure, there is a surprising lack of strategic information on the numbers of individuals funded at the various levels in this system. Many people spoke about 'the pyramid' model that defined the career path of researchers in the biomedical sciences, yet we found that some funding agencies could not easily provide statistics that defined their contribution to the different levels of the pyramid. It would seem desirable to have a UK overview of this pyramid shape, the reasons for it and the pressures on it.

The why of fellowships

Some agencies had a clear view of why they fund personal awards at the fellowship level, while others appeared to be much less clear. The



reasons given by the former varied from general capacity building in the biosciences, to the wish of some smaller medical charities and patient groups to attract good scientists to research their disease of interest. Sometimes a mix of strategic planning and sheer quality of applicant influenced the funding agency's portfolio, as in the case of the BHF, which had a defined geographical strategy within the UK but also supported individuals. There was a view that medical charities might fund fellowships out of habit. AMRC's view was that the habit was changing and that charities were questioning the reason why they were continuing to use fellowships as a method of funding research. We sometimes noted a variety of opinions within the funding agencies as to the overall philosophies they adopted to fellowships. Some staff held the view that the best scientists will come to the top, come what may. Others in the same agency had rather more enlightened views on their responsibilities to the system and, in particular, towards the treatment and training of post-doctoral researchers (the early career fellowship 'feeder layer'). The development of scientists in their early post-doctoral years is critical if we are to ensure that the best scientists do enter these fellowship cohorts. In the same context, some identified a need to ensure that senior scientists with fellowships take seriously their responsibilities to staff in their own groups.

Concentration of resource for added value, versus a completely responsive pattern, influenced agencies to differing extents. The BHF saw that their personal awards at the highest level (BHF Professors) allowed them to build infrastructure and capacity around these individuals, hence enabling their objectives of excellence in heart disease research and medical care. The Wellcome Trust Centres, and the natural concentration of many of their fellows into the highly funded universities, provided similar examples. CR-UK had developed policies to deal with the career development of its fellows both within CR-UK Institutes and in universities. A general point made by many agencies was that capacity building was part of their science strategy. The need to populate areas quickly, and to re-populate important but unfashionable areas, gives the targeted fellowship an important role.

The how of fellowships

Funding agencies such as CR-UK declared that they had made it their policy not to present individuals with a view of their fellowships as a career path. Rather, CR-UK had accepted that a fellowship appointment was a career opportunity. The Royal Society's fellowship programme was also designed to present career opportunities to exceptional scientists. The MRC appeared to view its fellowship programme as a career pathway rather than as a career opportunity, even though the progression route was a very steep pyramid. Most funding agencies allowed some possibility of renewal of the award. The BBSRC, however, was clear that one focus of a David Phillips Fellowship was to facilitate a permanent position in academia or industry. Its staff were satisfied that the length of the appointment fitted the purpose of the award.

The length of a fellowship appointment depended on the purpose of the award and, although they were constantly under review, many agencies were satisfied that the award lengths were currently about right.

Funding agencies varied as to whether they maintained a specific fellowship (and/or studentship or training) committee, or merely brought committees together for selection or interviewing. It was noticeable that those with dedicated committees (or a core membership) often, but not always, used this structure to assess, mentor and provide feedback to the fellows, as well as to monitor the statistics and outputs of the schemes.

Assessment of fellows and fellowships

Most of the agencies we spoke to were in a process of either assessing their fellowship schemes, or considering such an assessment. There appeared to be a number of drivers for this assessment (including financial, 'about time' and 'effectiveness' issues, and mergers). An in-depth review of BHF research funding was conducted about 3 years ago, and one of the key themes that emerged from that review was a need for emphasis on individuals. CR-UK completely reviewed its fellowship schemes after the

formation of the charity from the Imperial Cancer Research Fund and Cancer Research Campaign a few years ago. The staff presented a very coherent view of the philosophies behind their schemes, and what they wanted from fellows. They had also developed new guidelines on renewals and on the management of fellows both inside and outside their own institutes.

The pattern of holding, publishing and using year-by-year statistics on fellowship numbers varied widely between the funding agencies, as did the reporting and assessment requested (and obtained!) by the different funders from their fellows and HEIs. We were surprised by the general lack of full statistical data on fellowship awards, progression and subsequent career paths. All agencies maintained some record of the gender balance of candidates and awards. The Royal Society, BHF and CR-UK track all the individuals they fund, but the data is not published. We found that the BBSRC provided a very complete set of data on its fellowship schemes from its establishment in 1995, coupled with a detailed analysis of the first career destinations of the fellows.

The level of connection between the funding agency and the fellow during the award varied enormously. Some agencies, such as CR-UK and BBSRC, provided a mentor for their early career fellows and regular residential networking meetings. The Wellcome Trust also held annual meetings for its fellows. In addition to personal contact, some agencies required a formal annual report which was assessed by the fellowship committee. BBSRC fellows were required to submit annual reports and to attend a mid-term review, with feedback provided on both. This form of monitoring did lead to action: both BBSRC and CR-UK had withdrawn awards during the fellowship period. MRC held meetings for its fellows and used final reports only to the secretariat. Some funding agencies obtained less than 50% of the requested final reports from their fellows. Given that these are personal awards designed for career development, these would seem to be important outcome measures. The possibility (and likelihood) of renewal of the fellowship was discussed with

fellows by most agencies, sometimes formally, sometimes informally.

Relationships with host HEIs

The relationship with HEIs was a major issue for all funding agencies. In general, the agencies confirmed our conclusion that widespread differences in attitude and management exist between universities, and even between departments within the same university. Getting universities in general, and some in particular, to take more responsibility for the careers of fellows was a major issue for nearly all funding agencies. We found that most agencies echoed our views on the need for better partnerships and how to achieve these, possibly through more explicit financial commitments. It was recognised that a few UK centres of excellence provided such a rich environment for researchers that, even if subsequent relocation to a permanent position elsewhere was inconvenient, the opportunity to work in one of these institutions during the fellowship period made the experience worthwhile. It could, however, be made much more worthwhile if all HEIs adopted transparent best practice while the fellows were in the institutions.

The fellow's responsibilities

The responsibility of the fellows to attend to their own career development was raised by many in funding agencies and echoed our committee discussions. While there was much good practice identified and examples of individual excellence, there was also an underlying lack of attention among fellows to this issue. The fact that many fellows saw their fellowship as an escape from involvement in university teaching, administration and training was worrying. Even more surprising to us were the examples of fellows who refused the training offered by their funding agencies and HEI, and even refused to give assistance to those agencies in terms of committee membership and refereeing.

Confounding factors

The medical charities, with their different objectives,

have the potential to energise and renew the UK fellowship system. We detected a view that many of the confounding issues that could inhibit continued fellowship support were issues for OST and the HEFCs, not for the charities. The responsibility of the medical charities to fund medical research rather than universities, versus the responsibility of government and government agencies to fund both, was a point often raised by many of those we consulted.

The funding agencies were aware of a changing environment that might affect the pattern of fellowship funding. fEC of grant awards, the OST Academic Fellowships introduced after the Roberts' review and EU employment directive legislation, were all on the horizon. Many felt that fEC was the right way to go and there may be inevitable impacts on fellowships. However, none described definite plans to deal with these issues yet.

Appendix 3 - Academy of Medical Sciences Academic Careers Committee (non-clinical) membership

Professor Keith Gull CBE FRS FMedSci
(Chairman)
*Wellcome Trust Principal Research Fellow and Professor of
Molecular Microbiology,*
University of Oxford

Dr Andrea Brand FMedSci
Director of Research in Developmental Neurobiology,
University of Cambridge

Professor Richard Denton FRS FMedSci
*Professor of Biochemistry and Former Dean of Medical and
Veterinary Science,*
University of Bristol

Dr Anne Donaldson
*Royal Society University Research Fellow and Senior
Lecturer,*
University of Aberdeen

Dr Darrell Evans
Senior Lecturer in Anatomy,
Brighton and Sussex Medical School

Professor Barry Furr OBE FMedSci
Chief Scientist and Head of Project Evaluation,
AstraZeneca plc, Macclesfield

Professor Gillian Griffiths FMedSci
*Wellcome Trust Senior Fellow and Professor of
Experimental Pathology,*
University of Oxford

Professor Dame Nancy Rothwell FRS FMedSci
Pro-Vice-Chancellor,
University of Manchester

Professor Patrick Vallance FMedSci
Registrar of the Academy; Head, Division of Medicine,
University College London and *Chairman,*
Academy of Medical Sciences Academic Careers
Committee (clinical)

Secretariat
Ms Emma Bennett
Academic Careers Officer

Appendix 4 - List of those consulted during the review

Professor Colin Blakemore FRS FMedSci,
Chief Executive,
Medical Research Council

Professor Mary Bownes,
Head of Studentships and Fellowships,
Biotechnology and Biological Sciences Research
Council

Dr Joan Box,
Clinical Research Strategy Liaison Manager,
Medical Research Council

Professor Sir Richard Brook,
Director
Leverhulme Trust

Mrs Jean Cater,
Early Career Fellowships,
Leverhulme Trust

Dr Diana Dunstan,
Director of Research Management,
Medical Research Council

Ms Diana Garnham,
Chief Executive,
The Association of Medical Research Charities

Ms Bryony Gill,
Centre for the Study of Law and Policy in Europe,
University of Leeds

Ms Clare Glen,
Head, Research Support Section,
The Royal Society

Sir Charles George FMedSci,
Formerly Medical Director,
British Heart Foundation

Dr Candace Hassall,
Scientific Programme Manager, Basic Sciences,
The Wellcome Trust

Dr Fiona Hemsley, *Head of Institutes and Personal
Awards Funding,*
Cancer Research UK

Professor Raymond Hill FMedSci,
*Executive Director, Department of Licensing and External
Research*
Merck Sharp and Dohme

Dr Ian Lyne,
Head of Postgraduate Training and Fellowships,
Biotechnology and Biological Sciences Research
Council

Mrs Brenda Mortimer MBE,
Head of Council Secretariat and Liaison Branch,
Biotechnology and Biological Sciences Research
Council

Dr Sohaila Rastan FMedSci,
Director of Science Funding,
The Wellcome Trust

Dr Frances Rawle,
Head, Research Career Awards,
Medical Research Council

Professor David Read FRS,
Biological Secretary and Vice-President,
The Royal Society

Professor Ian Roberts,
Faculty of Life Sciences,
University of Manchester

Professor Robert Souhami CBE FMedSci,
Director of Clinical Research and Training,
Cancer Research UK

Professor John Tooke FMedSci,
Dean,
Peninsula Medical School

Dr Mark Walport FMedSci,
Director,
The Wellcome Trust

Dr Tanya Whitfield,
Department of Biomedical Science,
University of Sheffield

Dr Sally Woodward,
*Head of Neuroscience and Mental Health, and Physiological
Sciences streams,*
The Wellcome Trust

We were given much assistance, advice and information by formal and informal contact with academic and administrative staff at many Higher Education Institutes, Regional Development Agencies and at the Higher Education Funding Council for England and the Scottish Funding Councils for Further and Higher Education.

