The Academy of Medical Sciences

# MB PhD Programmes

## A Position Paper by the Academy of Medical Sciences

July 2007

**The Academy of Medical Sciences**

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

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

This position paper is published by the Academy of Medical Sciences and has been endorsed by its Officers and Council. Contributions by the working group and respondents to the call for evidence are made purely in an advisory capacity.

The members of the working group and the consultation respondents participated in this report in an individual capacity and not as representatives of, or on behalf of, their affiliated hospitals, universities, organisations or associations. Their participation should not be taken as endorsement by these bodies.

Contents

## MB PhD Position Paper

The report from the Academy of Medical Sciences 'Strengthening Clinical Research' highlighted the importance of addressing the translational gap between scientific discovery and clinical application.[1] Amongst the priorities to be faced in rebuilding the capacity to undertake clinical research in the UK, the Academy has emphasised a continuing need to train clinical researchers. In its 2002 analysis of the issues for implementing new career pathways for Clinician Scientists, the Academy noted the need to ensure appropriate integration of those who obtained a PhD via the UK MB PhD programme.[2]

In 2006, the Academy's Clinical Academic Careers committee initiated a study of the UK MB PhD programme as part of its analysis of clinical career pathways. The working group collected information and views from academia, industry and funders in the UK and reviewed the available evidence on programmes in the USA and EU. A symposium was organised in March 2007 to collect further evidence and stimulate discussion.

The terms of reference of the working group were: 'To evaluate the MB PhD schemes that currently exist within the UK. To determine where the MB PhD fits within the portfolio of academic career pathways and to recommend how the scheme should be organised and sustained in the UK'.[3,4]

[1] Academy of Medical Sciences (2003). *Strengthening clinical research.* http://www.acmedsci.ac.uk/images/publication/pscr.pdf
[2] Academy of Medical Sciences (2002). Implementing the Clinician Scientist Scheme
[3] Academy of Medical Sciences (2002). Implementing the Clinician Scientist Scheme

## Evidence base and emerging issues

Two intermediate outputs from the working group have been published by the Academy:

1. A background paper for the symposium describing the current UK status and outcomes, issues regarding the timing and duration of the PhD component, sources of funding, views from industry and analysis of international programmes.[5]
2. A summary of the symposium's proceedings describing further analysis of UK experience from faculty and student perspectives, comparison of other research training options and issues for integration in new academic training pathways and a detailed review of US experience.[6]

It is not the purpose of this final output paper to repeat all the points made previously in these publications, but key issues are highlighted here, preparatory to proposing recommendations for future action:

***Criteria for successful operation***
As defined by faculty responsible for the UK programmes, these include good integration of the research phase within the clinical course (including preparatory modules), critical mass of research supervisors at the clinical location, mentorship, student participation in programme management committee, and a commitment to support students as a cohort.

***Measuring outputs and impact***
Informal monitoring indicates that a high

[4] Membership of the working group is listed in appendix 3.
[5] See appendix 1.
[6] See appendix 2a and 2b.

proportion of graduates continue as clinical academics or are otherwise engaged in research with a range of impressive achievements in scientific discovery and career development to date. However, neither in the UK nor USA is there a formal attempt made systematically to collect information on graduate achievements and destinations (or to compare them with those emerging from other research training routes).

***Timing and focus of research training***

The timing of the PhD component has provoked vigorous debate. There is agreement that the PhD can always provide excellent generic research training but some are concerned that an early PhD choice of research subject may prove less relevant to subsequent medical career specialisation, compounded by potential difficulties for integrated programme students in maintaining contact with research after returning to medical training. Perspectives from individual students and faculty members show that any such obstacles can be overcome and, moreover, a case can be made for increasing flexibility of research experience in medical careers as in other scientific careers, but there is not consensus within the medical academic community on these points.

***View from biomedical industry***

Many industry respondents agreed that MB PhD graduates have an important role in building clinical research capacity, in contributing to translating basic science into health care innovation. Moreover, graduates have also found successful employment in companies in the UK and USA and training in experimental medicine has been particularly welcomed.[7] Larger companies have demonstrated their commitment by funding studentships.

## Recommendations

***1. Strategic coherence of a nationwide scheme***

On the basis of the experience in the UK over the last 10 years and by analogy with what is comparable in US initiatives, we conclude that the integrated MB PhD programme is valuable as one of the options for training clinical scientists. The recruitment of these graduates into the new academic training pathways for research requires monitoring to ensure that best use is made of those who will become a core part of the next generation of clinical researchers, while avoiding biasing pathways to the competitive advantage of a privileged few students.[8] There is a need to retain a diversity and flexibility of options and, in particular, to have a clearly defined training programme for those clinicians who wish to embark on a PhD later (i.e. post F2 Foundation Programme).

We recommend further consideration of the options to establish an expanded nationwide resource with sustained funding and we emphasise that these options must be explored within the broader context of (a) the Modernising Medical Careers initiative with its

[7] Academy of Medical Sciences (2006). Experimental medicine symposium summary 24 April 2006. http://www.acmedsci.ac.uk/p50evid50.html

[8] Report of the Academic Careers Sub-Committee of Modernising Medical Careers and the UK Clinical Research Collaboration (2005). *Medically – and dentally-qualified academic staff: Recommendations for training the researchers and educators of the future.* http://www.ukcrc.org/PDF/Medically_and_Dentally-qualified_Academic_Staff_Report.pdf

renewed emphasis on training, recruiting and retaining clinical academics; and (b) building partnerships between academia and industry.

We welcome and endorse the recommendations of the Cooksey report that the Translational Medicine Funding Board should seek to work with the UKCRC to coordinate the development and funding of MB PhDs in order to ensure that skill gaps are eliminated.[9] We also welcome the current interim review of the Biosciences 2015 report, one of whose recommendations had been to create a fund to support a significant number of new MB PhD studentships.[10]

We judge that the integrated MB PhD programme offers a convenient route for some students to experience industry research principles and practices (by short-term secondment and CASE Award-type studentships). We recommend that the options are further evaluated as part of the follow up to the Academy's working group on 'Research careers for biomedical scientists in industry – promoting greater mobility', in order to increase the role for industry as funder and partner, and to promote multidisciplinary interfaces.

The Academy, together with the Medical Schools Council, has a key role to ensure that the ongoing discussions inspired by the Cooksey and Bioscience 2015 reports, and accompanied by the evaluation of the piloting of the new academic training pathways, take account of the evidence and expert views collated by the present working group.

***2. Support for graduate cohorts***

The current support for students and graduates provided by the individual institutions involved with integrated programmes could be enhanced by increasing linkages between the host faculties to share good practice and by their jointly organising an annual scientific meeting/open day where the cohorts can meet. We recommend that the programme leaders in Cambridge, UCL and Leicester now collectively initiate an annual event for current and past students; this event might also provide a useful central information resource for other stakeholders (for example Research Councils, medical research charities, companies, learned societies) and for institutions contemplating introducing similar courses.

Additional support should also be provided by creation of a nationwide mentoring scheme, developed within the framework of the Academy's clinical scientist mentoring scheme, but we recognise that there is, currently, insufficient capacity within the Academy's Fellowship to provide individual mentoring. We support the Academy's desire to create an 'outreach programme' of mentorship training and career support, delivered within the university/medical school setting. In addition to the general benefits of mentoring by role models, there is particular value in the mentoring process for the MB PhD cohorts in providing them with continuing exposure to the research environment and in clarifying career advice on appropriate paths to employability. The increasing array of

[9] Cooksey D (2006). *A review of UK health research funding*. HMSO, London.
[10] Biosciences and Innovation Growth Team (2003). Bioscience 2015: *Improving National Health, Increasing National Wealth.* http://www.bioindustry.org/bigtreport/downloads/exec summary .pdf

options necessitates improved career advice for students and support to ensure that students make the right choice for themselves.

***3. Monitoring outcomes***

There is a continuing need to develop a simple monitoring system to track individuals through the clinical academic pathway and other career destinations in order to compile the evidence base necessary to determine if programmes should be expanded. We welcome the current Department of Health plans to collect data and recommend that all MB PhD graduates are tracked and information be collected to evaluate scientific achievements in addition to formal career progression.

Of course, the value of such tracking is by no means confined to assessment of MB PhD graduate outcomes and we recommend the Academy also continues to explore the options for a comprehensive system as part of the follow up to the 'Freedom to Succeed' proposal and in light of continuing discussion on the operability of other tracking databases and the potential impediments relating to secondary use of personal information.[11]

***4. Exposing all medical students to scientific research***

It is a general concern in teaching many scientific disciplines that the practical content of the curriculum has tended to decline. This tendency should be reversed and we recommend that the Medical Schools Council considers further the strategic possibilities to encourage medical schools to expose all medical students to some aspects of research, including project work and research methods.

[11] Academy of Medical Sciences (2005). *The freedom to succeed – A review of Non-clinical Research Fellowships in the Biomedical Sciences.* http://www.acmedsci.ac.uk/images/publication/AcdMedSc.pdf

# Appendix 1: Interim summary paper outlining the objectives and outputs of the MB PhD working group (January 2007)

## Introduction

The report from the Academy of Medical Sciences 'Strengthening Clinical Research' (2003) highlighted the importance of addressing the translational gap between scientific discovery and clinical application.[12] Among the priorities to be faced in rebuilding the capacity to undertake clinical research in the UK, the Academy has emphasised a continuing need to train clinical researchers as part of coherent career pathways. In its analysis of the issues for implementing new career pathways for Clinician Scientists (2002), the Academy noted the need to ensure appropriate integration of those who obtained a PhD via the UK MB PhD programme.[13] The recent report of the Academic Careers sub-Committee of Modernising Medical Careers and the UK Clinical Research Collaboration (2005) recommended that a limited number of MB PhD schemes are maintained with appropriate funding and that progress of graduates from these programmes is tracked.[14]

In 2006, the Academy's Clinical Academic Careers committee initiated a study of UK MB PhD programmes as part of its ongoing analysis of clinical career pathways. The purpose of this short paper is to summarise the objectives and outputs from this working group as an input to inform a symposium, to be held on March 8 2007.[15]

***Remit of the working group***

The terms of reference of the working group[16], chaired by Professor Mike Spyer FMedSci are: 'To evaluate the MB PhD schemes that currently exist within the UK. To determine where the MB PhD fits within the portfolio of academic career pathways and to recommend how the scheme should be organised and sustained in the UK.' The specific tasks are to:

1. Undertake a succinct, high-quality review of the existing MB PhD schemes in the UK

2. Identify what currently does and does not work within UK programmes

3. Make comparisons with the MB PhD programmes of other countries

4. Consider appropriate ways of organizing and funding the scheme

5. Identify the potential for developing the programme within the new academic career pathways

6. Advise the UK Clinical Research Collaboration and other stakeholders of the findings of the report and, where appropriate, recommend action.

An open call for evidence invited views from the UK, elsewhere in Europe and the USA, collecting data on numbers and origins of students, PhD research fields,

[12] Academy of Medical Sciences (2003). *Strengthening clinical research.* http://www.acmedsci.ac.uk/images/oublication/pscr.pdf

[13] Academy of Medical Sciences (2002). *Implementing the Clinician Scientist Scheme* http://www.acmedsci.ac.uk/p99puid24.html

[14] Report of the Academic Careers Sub-Committee of Modernising Medical Careers and the UK Clinical Research Collaboration (2005). *Medically – and dentally-qualified academic staff: Recommendations for training the researchers and educators of the future.* http://www.ukcrc.org/PDF/Medically_and_Dentally-qualified_Academic_Staff_Report.pdf

[15] See Appendix 2a and 2b

[16] Membership of the working group is listed in Appendix 3.

course curriculum, design and management, funding, subsequent career tracking and measurement of individual achievements and programme impact. The working group met on three occasions to consider the evidence and identify key issues.

## Key issues

***Current UK status and outcomes***

Integrated MB PhD programmes are run by Cambridge (started 1990, total students to date enrolled, 131) and University College London (UCL) (1994, 62) with a much smaller programme at Leicester. A significant proportion of students have transferred from other UK medical schools (for example, approximately 25% in the Cambridge programme).

The research subjects undertaken for the PhD are very diverse. Although the majority are in the relatively basic sciences with neurosciences, immunology, molecular genetics and cell biology the most frequent, a significant proportion of topics involve experimental work with whole animals or humans and there have been some non-laboratory areas (for example social sciences, primary care, public health, psychology).

The analysis available to date (primarily from the Cambridge cohorts) indicates that the clinical and scientific achievements of the group have met the expectations for high academic standards and that a large proportion of graduates will pursue a clinical academic career, including some in procedural specialities (for example, cardiology) and those associated with surgery, fields currently suffering from falling academic input and appointment in the UK.

Intercalated PhD MB programmes are run by other UK universities (for example, Imperial, Newcastle) but these are not usually regarded as integrated programmes in the same sense as the Cambridge, UCL and Leicester activities.

***Timing of PhD component***

Some respondents to the call for evidence suggested that it was better to embark on PhD research after completion of medical training. Perceived problems associated with timing of the current UK integrated MB PhD programmes included:

- Difficulties in maintaining contact with research after returning to medical training.
- Doubts about the direct relevance of the specific PhD project; individuals may develop different research interests during their subsequent clinical training
- Concerns that candidates may have problems returning to an academic research career as they may not have a track record to enable them to compete for senior funding such as Clinical Fellowships.

However, those who have had most direct involvement with current MB PhD programmes (academic staff and students) observed that the early commitment in a PhD course is highly valuable in inculcating research culture, training and independence, that will enhance the subsequent medical training, and in providing research exposure to a cohort of students with similar long-term aspirations. Research skills are transferable and many graduates have continued in the same academic area as their PhD field. It is noteworthy that it is considered quite usual for those with a PhD in areas of science outside medicine to change scientific focus, perhaps several times, yet medical research careers seem to be increasingly

inflexible. There is a good argument to be made that the narrowness of the standardised clinical research career model should be resisted.

***Duration of PhD***

Feedback from students indicated some concern. The duration of the PhD element (often less than three years) within the integrated programme may be too short for many projects and associated training needs, thereby placing students under additional pressure to perform.

***Sources of funding***

Feedback from the major UK public sector PhD funders indicates a need to provide more systematic data on the success of the current scheme – particularly in terms of career development – in order to elicit new support via specifically-designated funds.

Currently, funding support is difficult to secure and often seems relatively arbitrary. A case for a nationwide, competitive scheme could be made, to ensure that funding is equitable and transparent. Some respondents also advised that there should be greater flexibility to provide funding extension, if required.

***Views from industry***

Pharmaceutical and biotech companies in the UK recognise an important role for research-trained clinicians in industry and actively endorse the broad needs for the UK to promote translational research. Both larger and smaller companies express interest in MB PhD schemes and some of the larger companies have provided significant financial support for programmes and students. The biotech sector, through its involvement with the BioScience Innovation and Growth Team recommendations (BioScience 2015 report) has called for an expansion of the current scheme (to 30 new studentships annually in the short term, rising to 100 annually), to be jointly funded by The Office of Science and Innovation (OSI) and Higher Education Funding Councils (HEFCs).[17]

Specific feedback from companies in the call for evidence recommended that PhD training should include *in vivo* pharmacology as well as molecular methods and that students would also benefit from a 'sandwich year' or equivalent exposure to multidisciplinary projects devised in collaboration with industrial partners. Companies would be inclined to provide increasing financial support if opportunities for active collaborative engagement are identified. Some also called for training in project and people management skills.

***Integration of MB PhD programmes into new academic training pathway***

One area of current uncertainty relates to how MB PhD programmes can fit into the new training pathways. The working group will seek further discussion with UKCRC and others to explore how the new F2 training programme and MB PhD course might be aligned, to enable MB PhD students to fit into the integrated career pathways, so enhancing the usefulness of the early research training.

***Analysis of US MD PhD programmes***

The first US universities started programmes more than 40 years ago and many have been in existence for more than 30 years. The US programmes are comparatively well funded, with several hundred new entrants annually and a majority of students supported centrally via the National Institutes of Health (NIH)

[17] Biosciences and Innovation Growth Team (2003). *Bioscience 2015: Improving National Health, Increasing National Wealth.* http://www.bioindustry.org/bigtreport/downloads/exec summary .pdf

Medical Scientist Training Program (covering 45 degree-granting institutions). MSTP graduates are judged as extremely successful in pursuing research careers and obtaining research funding; the programmes are well regarded by students and by many companies. Participants in MD PhD programmes are often regarded as exceptionally able and a high proportion of clinical academics are recruited from this pool. It is, however, highly relevant that the subsequent US training pathways are well designed to accommodate and fast track the supply of MD PhD graduates, something that has yet to be achieved in the UK.

One other valuable feature of some US programmes is the opportunity to enrol in a PhD field outside conventional bioscience disciplines, for example in engineering, maths or physics – such skills are increasingly important in medical research.

## Emerging findings

As an input for further discussion in the symposium the preliminary conclusions of the working group can be summarised.

1. On the basis of the experience in the UK over the last 10 years, some strongly propound the value of the integrated MB PhD programme as one of the options for training clinical scientists. The integration of these graduates into the new academic training pathways for research merits further consideration and clarification (particularly with respect to entry on the fast track to clinical lectureship).

2. There is a need to retain a diversity and flexibility of options. It is critically important to have clearly defined training programmes for those clinicians who wish to embark on a PhD later (i.e. post F2 Foundation Programme) and to avoid biasing any MB PhD programme to the competitive advantage of a privileged few students. The implications of the Bologna Agreement (which involves a significant number of European countries working towards greater consistency and portability across their higher education systems) on clinical research training may need further consideration.

3. In all PhD programmes it is important to ensure support for student cohorts – encouraging interaction within MB PhD streams and with non-clinical students. This may become an important function in developing the Academic Medical Centres.

4. It would be valuable to institute a nationwide mentoring scheme involving past and present students and this might usefully be developed within the framework of the Academy's clinical scientist mentoring scheme. Mentoring should be accompanied by other efforts to retain connections within the previous PhD cohorts (for example, a programme of meetings) and with the research environment.

5. There is need to explore the options for a shared national database to track career outcomes (including the relative success rate of MB PhD graduates in their fellowship applications), which might be implemented as part of other proposals for tracking databases (for example, the Academy's 'Freedom to Succeed' proposal, current Wellcome Trust-led discussion)[18].

6. It is also important to ensure that MB PhD graduates are able to continue to

[18] Academy of Medical Sciences (2005). The freedom to succeed – A review of Non-clinical Research Fellowships in the Biomedical Sciences. http://www.acmedsci.ac.uk/images/publication/AcdMedSc.pdf

capitalise on opportunities for research in industry and the options for facilitating early exposure to the company research environment should be considered further. The Academy's working group 'Research careers in the biomedical sciences: promoting mobility between academia and industry' should be kept involved in the ongoing discussions on MB PhD options.

7. Aside from the issues for PhD options, there is great general value in exposing all medical students to some aspects of scientific research (including engagement with project work and research methodologies). The tendency to reduce the practical content of the curriculum throughout education must be reversed.

# Appendix 2a: MB PhD Symposium programme

Date: Thursday March 8th 2007, 13:00 – 17:00

Venue: Royal College of Pathologists, 2 Carlton House Terrace, London SW1Y

| | | |
|---|---|---|
| 13:00 | Registration & light lunch | |
| 13:30 | Welcome to the Academy | Professor Patrick Maxwell FMedSci<br>(Chair of the symposium) |
| 13:35 | Introduction | Professor Mike Spyer FMedSci<br>(Chair of the working group) |
| 13:45 | The UK MB PhD scheme, successes and challenges | Professor Tim Cox FMedSci |
| 14:05 | Perspectives from a MB PhD graduate pursuing a clinical academic career | Dr Rhys Roberts |
| 14:25 | Ensuring diversity of PhD training routes | Professor Robert Lechler FMedSci |
| 14.45 | Tea | |
| 15:10 | The new academic training pathways, integration of the MB PhD programme | Dr Mark Walport FMedSci |
| 15:30 | The US experience of the MD PhD programme | Professor David Korn |
| 15:50 | Panel Discussion | Professor Patrick Maxwell FMedSci<br>*Academy of Medical Sciences (Chair of Panel)*<br>Professor David Korn<br>*Association of American Medical Colleges*<br>Dr Mark Walport FMedSci<br>*Wellcome Trust*<br>Professor Sir John Tooke FMedSci<br>*Council of Heads of Medical Schools*<br>Dr Richard Tiner<br>*Association of the British Pharmaceutical Industry* |
| 16:50 | Concluding remarks | Professor Patrick Maxwell FMedSci |
| 17:00 | Close | |

# Appendix 2b: Proceedings of the MB PhD Symposium, 8 March 2007

Welcoming participants, the symposium Chairman, **Patrick Maxwell FMedSci** (Imperial College London and Registrar of the Academy) observed that it is now opportune to review the status of current MB PhD programmes in the UK with a view to identifying key issues for their potential expansion and funding.

**Mike Spyer FMedSci** (University College London and Chairman of the MB PhD working group) described the remit of the Academy's working group, convened at an important time in the context of the broader considerations of the Modernising Medical Careers initiative and the renewed emphasis on training, recruiting and retaining clinical academics. The MB PhD programme allows a selected group of students to develop their science skills while completing their undergraduate medical education. Various expert bodies (for example, the reports from the Biosciences and Innovation Growth Team, 2003; Walport, 2005; Cooksey, 2006) have already indicated the importance of such programmes in maintaining the clinical research capacity of the UK as a global leader in translating basic science into healthcare innovation.[19,20,21]

The objectives and initial analysis of the Academy's working group are described in a briefing paper circulated to participants.[22] The purpose of the symposium is to stimulate further discussion to inform the development of the working group's outputs and to consider the operation of the specific MB PhD programmes within the broad environment of research training for clinicians, identifying where there are generic issues, for example for monitoring and mentoring.

**Tim Cox FMedSci** (Cambridge) reviewed the UK MB PhD scheme, successes and challenges from the perspective of the longest running programme in Cambridge (started in 1990), emphasising the integrated nature of the programme such that clinical teaching is maintained during the PhD research period. Approximately 25% of the students have transferred from other UK medical schools and, of the current students, approximately half are women. Of those who have already completed the programme, a high proportion continue as clinical academics or are otherwise engaged in research. The Cambridge programme is judged a success in terms of the student competition for places and in the quality of graduate outputs with regard to scientific discovery and career development across a range of medical specialities.

Some of the special features of the programme contributing to this success include the continuity of mentorship that

[19] Biosciences and Innovation Growth Team (2003). *Bioscience 2015: Improving National Health, Increasing National Wealth.* http://www.bioindustry.org/bigtreport/downloads/exec summary .pdf

[20] Report of the Academic Careers Sub-Committee of Modernising Medical Careers and the UK Clinical Research Collaboration (2005). *Medically – and dentally-qualified academic staff: Recommendations for training the researchers and educators of the future.* http://www.ukcrc.org/PDF/Medically_and_Dentally-qualified_Academic_Staff_Report.pdf

[21] Cooksey D (2006). *A review of UK health research funding*. HMSO, London.

[22] See Appendix 1

is provided, independent of the clinical training and research supervision, the integration of the research phase within the clinical course (including provision of an intensive preparatory clinical academic module), involvement of student representation on the programme management committee and the growing availability of a pool of dedicated research supervisors to provide critical mass at the clinical location. Taken together with an annual meeting for past and present students, these features deliver support for the MB PhD students as a cohort. Professor Cox concluded that the MB PhD programmes are impressive flagship schemes despite their lack of general adoption in UK medical schools. Continuing challenges for the programme at the local level include the search for sustained funding and the need to cope with changing clinical examination structure. At the national level, increasing the success of the programme further requires integration within the new academic training pathways and core support via a national initiative.

**Rhys Roberts** (Cambridge) provided a personal view as a MB PHD graduate pursuing a clinical academic career. His PhD study of intracellular myosin transport in eukaryotic cells has led to a continuing interest in cellular motor function and the regulation of protein complexes in a range of neurodegenerative disorders with consideration of the potential targets for therapeutic intervention.
The advantages of the integrated MB PhD programme from this graduate's perspective resided in the initial flexibility to choose from a range of research topics, in the subsequent opportunity for PhD research interests to be continued and, generally, in the introduction of the research training ('learning the research language') early on in a career when there is less distraction by other commitments. This personal perspective also provides an answer to some of the concerns about the programme raised by others.[23] For example, even if the PhD research is not directly linked to subsequent career focus, this may matter less if the PhD is regarded as a generic training opportunity. Furthermore, while some may worry that it becomes relatively difficult to return to research after the gap for clinical training, there is a growing cohort who can demonstrate that they have been able to do so. Subsequent discussion reinforced the importance of mentoring schemes to allow the student continuing contact with the research environment while completing clinical competencies. Other concerns explored during discussion covered the potential time constraints on the duration of the PhD phase (not a problem for the majority of students) and the desirability of integrating MB PhD students with other PhD students during the research phase (generally successful).

**Robert Lechler FMedSci** (King's College London) presented on the importance of ensuring a diversity of PhD training routes in the current clinical training environment. While the MB PhD integrated programmes are delivering impressive graduates, there is also a continuing need for flexibility in provision in the development of the clinician scientist. Arguably, the default option should be to schedule PhD training during the early part of the Specialist Training years, with postdoctoral research then scheduled towards the end of the Specialist Training years.

[23] See Appendix 1

Systematic mentoring provision is required to attract the best students to research and to help them navigate the research training options. As the generic option, this later introduction to PhD research might be assumed to be more cost-effective insofar as it invests in more mature, differentiated, students whose commitment to the clinician scientist track can be anticipated to be sustained. Moreover, later research training can be tailored to correspond to the chosen career speciality, with a continuum of research through to the first position as Principal Investigator so that, most importantly, there is reduced risk of de-skilling during research gaps. From this perspective, the principle of flexible provision requires prescribing of the timetable for the generic pathway because the finite resources for clinical scientist training must be invested effectively and because it is important to avoid biasing academic Foundation Programme place provision against those who delay their research training. This concern received further attention during discussion. While the current annual output of MB PhD graduates (20-30) is relatively small compared to the total number of clinicians in research training (approximately 400), so that the potential for displacement of those clinicians who delay their PhD might seem small at the national level, there might be displacement at the local level. One other general issue raised in discussion appertaining to the flexibility of provision was the importance of introducing all medical students to research methods and opportunities. Although this issue is partly a general one for curriculum practical content, among the other research training options mentioned favourably were the MRes programme at Manchester medical school and developments in the intercalated BSc, if that can provide significant research experience.

**Mark Walport FMedSci** (Wellcome Trust) reviewed the integration of the MB PhD programme in the new academic training pathway with regard to the overall objective of the Modernising Medical Careers initiative to shorten the duration of clinical training.

The development of the Integrated Academic training pathway is intended to tackle some critical previous weaknesses – the lack of clear route of entry and of transparent and integrated career pathway, the long clinical training period between PhD completion and return to research, and the lack of exit routes from the clinical training pipeline. The new pathways offer potential for MB PhD students to continue research while doing clinical training and it is anticipated that MB PhD programme graduates can compete well at every stage of the training pathway. Professor Walport agreed that flexibility in provision is crucially important because there is no single answer to the question of when is the best time to do a PhD or, indeed, for how long a PhD should last (the Wellcome Trust has demonstrated considerable value in its four year PhD programme).

**David Korn** (The Association of American Medical Colleges) described the US experience of MD PhD programs that have attracted significant institutional support. In 2007, NIGMS funded 903 students on the Medical Scientist Training Program (MSTP), established 40 years ago with the objective to prepare students for translational and patient-oriented research. In addition there are other federally and non-federally funded MD

PhD programs. The National Academies of Science report in 2005 concluded that 'the MSTP program…has been brilliantly successful at attracting outstanding physicians into basic biomedical research, much to the benefit of future health care' and recommended that the MSTP program funding be expanded by at least 20%.

The AAMC has evaluated performance of the MD PhD programs by analysis of success rates of NIH RO1 grant applications over the last four decades. In aggregate, there is evidence that MD PhD graduates outperform MD or PhD graduates. MSTP MD PhD graduates do better than their non-MSTP peers in terms of postdoctoral awards and faculty appointments in leading medical schools. Employment of MD PhD graduates in university faculties is not confined to the medical departments, but are proportionately comparably distributed in surgical and hospital departments, reflecting the growing interest of these departments in research.

There is no consolidated US national database on MD PhD career destinations (although there is some information at the individual medical school level, for example University of Pennsylvania), and there is little information on the number of MD PhD graduates working in industry or on non-NIH funded research. Despite these limitations in the available data it is concluded that MD PhD programs have been very successful in accomplishing their objectives to attract and nurture medical students in scientific careers.

The panel discussion session brought together Patrick Maxwell, Tim Cox, Mark Walport and David Korn with Professor Sir John Tooke FMedSci (Peninsula Medical School and Chairman of CHMS) and Dr Richard Tiner (Association of the British Pharmaceutical Industry). Among the topics explored further were:

1. Comparison of the US and UK systems. In the USA there are approximately 17,000 medical students entering each year with more than 1,000 funded on MD PhD programs. In the UK, of approximately 8,000 medical students per year, only about 30 enter MB PhD programmes, an order of magnitude less (although the corresponding numbers of those starting later on a PhD are not so easily ascertainable). Hence, based on US experience, there is a good case for expanding UK programmes, although the US programs are not necessarily directly equivalent, in terms of integration, because their students typically do not have significant clinical exposure during their PhD research. There is also concern for the future in the USA, because a changing medical curriculum (reducing the emphasis on basic science teaching in the first two years) may decrease the preparedness of students to embark on the early PhD.

2. The UK pharmaceutical and biotechnology industry sectors are supportive of the MB PhD programmes and larger companies fund studentships. The industry sector wants more trained clinical scientists – particularly in experimental medicine as well as in basic biology. There is also significant need to promote mobility between industry and academia, an issue currently being examined by the Academy's working group on Careers in Industry. Among the options to build contact with industry R&D is a proposal to provide a three month secondment during the F1F2 Foundation Programme to augment the other current schemes (for example

industry-funded clinical pharmacology training) found to be effective.

3. Reinforcing points made earlier, shorter research training options (for example MRes, MPhil), as an intermediary step in developing skills, are proving popular and should be considered further. In the US there is currently much interest in developing integrated medical school programs that lead in 5 years to both the MD and an MS degree in Clinical Research. It is thought that such training, supplemented by rigorous postdoctoral research training (for example, a 5-year program beginning during the clinical fellowship) may provide a shorter path to independent careers in academic clinical research. However, an increasing array of options necessitates improved career advice for students on their appropriate paths to employability, highlighting a pervasive theme in the symposium, the importance of mentoring.

# Appendix 3: Membership of the working group

**Professor Mike Spyer FMedSci (Chair)**
Vice-Provost (Biomedicine) & Dean, University College London

**Professor Tim Cox FMedSci**
Professor of Medicine, University of Cambridge

**Dr Robin Fears**
Senior Policy Adviser to the Academy of Medical Sciences

**Professor Ian Lauder FMedSci**
Dean, Leicester Medical School

**Professor Robert Lechler FMedSci**
Vice-Principal (Health), King's College London

**Mr Daniel Marks**
MB PhD student, University College London

**Professor Paul Morgan FMedSci**
Professor in Medical Biochemistry and Immunology, University of Cardiff

**Dr Rhys Roberts**
Past MB PhD student, University of Cambridge
Currently a Specialist Registrar in Neurology at Addenbrooke's Hospital, Cambridge

**Mr Jonathan Roos**
MB PhD student, University of Cambridge

**Dr Katie Petty-Saphon**
Executive Director, Council of Heads of Medical Schools

**Dr Sarah Tabrizi**
Clinician Scientist Fellow, Clinical Senior Lecturer, Institute of Neurology, London

**Secretariat**

Ms Emma Bennett
Biomedical Grants and Policy Officer, Academy of Medical Sciences

Dr Suzanne Candy
Biomedical Grants and Policy Manager, Academy of Medical Sciences

The **Academy** *of* **Medical Sciences**

Academy of Medical Sciences
10 Carlton House Terrace
London, SW1Y 5AH
Tel: +44(0)20 7969 5288
Fax: +44(0)20 7969 5298

Email: info@acmedsci.ac.uk
Web: www.acmedsci.ac.uk
Registered Charity No. 1070618
Registered Company No. 3520281