The Cambridge Bachelor of Medicine (MB)/Doctor of Philosophy (PhD): graduate outcomes of the first MB/PhD programme in the UK

Timothy M Cox, James Brimicombe, Diana F Wood and D Keith Peters

ABSTRACT – We reviewed outcomes of the Cambridge Bachelor of Medicine (MB)/Doctor of Philosophy (PhD) programme for the period 1989–2010. Of the 90 alumni contacted, 80 (89%; 24 women) completed an anonymous questionnaire. Thirty were academic staff and 35 were in general professional (core) or higher medical training. Of the latter, 11 were specialty registrars, six were academic clinical fellows and three held academic foundation year posts. Eight alumni were overseas, including five in North America. Most (95%) respondents considered that their academic career goals were facilitated by the programme. Sixty-eight of the 80 alumni had conducted further research, 63 (79%) were active in research, and 90% had explicit plans for further full-time research. Twelve graduates had further substantive research support (six clinician scientist awards and three senior fellowships) and two were Wellcome Trust postdoctoral MB/PhD fellows. Alumni included two full university professors, one reader, six senior lecturers, two assistant professors and nine university clinical lecturers.

MB/PhD programmes offer an alternative training pathway for clinician-scientists in UK medical schools: the Cambridge programme promotes scientific discovery and sustained academic development within the context of contemporary medicine and clinical practice.

KEY WORDS: clinical academic, MD/PhD, postgraduate, research, training

Introduction

Medical graduates who wish to pursue a research career require long periods of scientific training combined with clinical practice. Rapid changes in the National Health Service and radical reforms in medical training and contractual initiatives, with increasing competition for long-term substantive research funding and training posts, are challenges for clinical academics – these issues particularly affect procedural specialties, including surgery.

Doctor of Medicine (MD)/Doctor of Philosophy (PhD) programmes have long been established in North American medical schools to enhance recruitment to academic medicine. These programmes focus on clinical investigation, especially translational research, which is perceived as a requirement for innovation in medical practice. The medical scientist training programme (MSTP) in the largest public university in the USA, the David Geisinger School of Medicine, University of California (UCLA), has 150 graduates, 70 of whom are academic physician scientists. Comparable educational investment has been called for in the UK to populate translational science within the clinical training environment.

The Cambridge Bachelor of Medicine (MB)/PhD programme was the first to be incorporated formally within a traditional European clinical curriculum. It is one of three options for clinical medical education in Cambridge and currently extends for nine years from matriculation. Three years of full-time research are integrated within the standard undergraduate clinical course, which combines a preclinical programme that focuses on core medical sciences; a compulsory third year leading to a bachelor degree; and a clinical course with emphasis on linking knowledge with clinical, practical and communicative skills and attitudinal and professional development. During the research period, integrated clinical studies continue in the form of weekly bedside teaching supplemented by seminar and tutorial teaching in clinical medicine. After submitting their PhD thesis, MB/PhD students return to full-time clinical teaching for two years to obtain MB/Bachelor of Surgery (BChir) degrees.

The MB/PhD programme is open to students from all medical schools in the UK, subject to acceptance on the Cambridge clinical course. Applicants require an honours degree of at least 2:1 grading in medical sciences; there is an additional application and interview. The Medical Research Council, Wellcome Trust, Department of Pharmacology and Trinity College, Cambridge, provided research studentships for the first seven years of the programme. Since 1997, support has come from diverse external charities and trust funds, including internal studentships from colleges, university departments and affiliated institutes in Cambridge. A management committee oversees timetabling, clinical placements and academic performance. In annual symposia, programme students present their scientific...
work to peers, external guests, academic stakeholders and charities.

To ascertain the effects of the MB/PhD programme in the 21 years since its introduction, we examined the outcomes of a cohort of its graduates using indicators including the proportion that has obtained support for postdoctoral research, their record of scientific publications and their desire for, and ultimate success in obtaining, academic appointments.

**Methods**

We report the outcomes of students on the MB/PhD programme between 1989 and 2010. Clinical graduates of the programme from 1994 to 2009 were contacted anonymously via email by an experienced statistician to ask for details of their current position, scientific publications and career plans. They were invited to complete an online survey and questionnaire. No further communication took place until the analysis was completed.

**Programme review**

**Applications, admissions and graduations**

Applications to the programme have risen; applications from women rose rapidly in the first years and now constitute about one-third of enrolments (Table 1). Of 162 clinical undergraduates enrolled in the years 1989–2010, nine have left and 50 of the remaining 153 are women. A total of 107 students (34 women) had obtained clinical qualifications by 2010; at the time of the study, 46 students were in the clinical or research phases.

**Transfer from other universities**

Of the 162 students enrolled to 2010, nearly one-quarter (n=36) transferred from other universities. Many clinical medical students studying in the UK from countries outside of the European Union apply, with 24 non-EU students enrolled from overseas.

**Research topics**

Students are encouraged to explore departments throughout the university and its affiliated institutes for their research projects. Whole-animal physiology, including neuropsychology, is the most popular and constitutes about one-quarter of the research projects; molecular oncology and neuroscience are also popular, together with immunology and transplantation sciences (Table 2). Apart from ‘wet-lab’ research, studies in intact animals and humans – including public health, radiology, pharmacology, brain repair and neuropsychology – are popular.

**Academic achievements**

Most (95%) students on the programme completed their research within 3.5 years. Two who had published research declined to submit a thesis. Most students publish their research findings in peer-reviewed journals of high international impact, and several have made discoveries that led to them being awarded national or international prizes for their achievements.

Of the 80 respondents, 47 had been awarded distinctions under the former (separate subjects) and current (integrated) final MB regulations. Most programme graduates have secured their preferred postgraduate training position and reported that their dual qualifications were an advantage at the competitive selection stage for clinical specialist training posts.

Less than 6% of students abandoned their research and left the programme: seven men and two women. Two (one woman) completed a Master of Philosophy (MPhil) degree before returning to clinical studies and one died unexpectedly during his final research year; they are not included in the overall analysis.

**Postgraduate careers of MB/PhD alumni**

Of the 31 MB/PhD programme students in academic positions who graduated by 2006 and had undertaken higher medical training in specialties, 17 were in tenured or tenure-track academic positions, including clinician/scientist or international travelling awards (n=6), clinical lecturerships within the university hospital system (n=2) and scientific group leader positions (for example, in the Wellcome Cancer Research UK Institute for Developmental Biology and Cancer and in neuroscience within
the Department of Anatomy, University of Cambridge). Seven had higher training within specialties allied to surgery (neurosurgery, orthopaedic surgery, accident and emergency medicine, and otorhinolaryngology). One graduate has a tenure professorship and is departmental chairman of anaesthetics in a well-known medical school in the USA; another graduate holds a chair in psychiatry in the UK (appointed early 2011). Overall, 22 graduates were in academic group leadership positions. Of the 29 respondents who graduated in the five-year period 1994–9, more than half have clear plans for further academic development, including periods of full-time scientific research activity within clinical medicine. Other career destinations include major pharmaceutical companies (Table 3). One graduate works in bioinformatics, and one working in biomedical computing allied to pathology has enrolled on a Master of Business Administration (MBA) programme.

Discussion

Educational courses that offer clinical and research experience leading to MB and PhD degrees are unusual in Europe, and the Cambridge MB/PhD programme was an innovation in the UK. Our experience shows that engaging medical students’ commitment to scientific research early in their careers encourages academic development and is associated with achievement of professional independence.

Students on the MB/PhD programme differ in their pattern of research activity from medical students who have undertaken conventional clinical training with the later option of applying for training fellowships after qualification. Most of our MB/PhD graduates continue academic work, and a majority gain further grant support for intermediate- and long-term fellowships – or faculty positions. Eighty (89%) alumni who had graduated with the MB/BCChir degree in the period 1993–2008 provided full responses to the online questionnaire; of those, 31 were full-time academic staff and 90% explicitly expressed plans for further full-time research.

Graduates from the MB/PhD programme in the UK may differ from those in one survey in the USA, in which concern was expressed about the proportion of MD/PhD graduates not intending to pursue research as a primary professional activity (44%). An evaluation of MD/PhD alumni in the four years from 1986–1990 reported that only 25% applied for grants to the National Institutes of Health (NIH) and suggested that a minority become independent investigators. Whether proposed changes to the career structure, with a more integrated approach to the academic pathway, will improve these figures is uncertain. A comprehensive recent study of 5,969 current and former trainees in 24 programmes in the USA enrolling >40% of current trainees and representing half of the entire MD/PhD training funded by the NIH showed that most (81%) were employed in academia, research institutes or industry; 82% of those in academia were conducting research; and more than 60% had research funding. We acknowledge that not all graduates from the MB/PhD programme in the UK will take up clinical academic positions or posts in university teaching hospitals but contend that the proportion actively pursuing their research interests is greater than would be expected of British clinical graduates. The careers of our MB/PhD graduates indicate that such programmes are one mechanism by which recruitment into academic medicine can be stimulated in the UK and that their introduction may address the widely held view that clinical science and academic medicine is in crisis. A few MB/PhD graduates in the UK are in senior positions in major pharmaceutical companies and thus are also positioned to contribute to the general development of translational scientific research, which is crucial to the development of medical therapies. Two graduates have become established group leaders and faculty members within the preclinical sciences community in Cambridge, enhancing links between the core and clinical biomedical sciences.

Our review of careers has revealed the involvement of MB/PhD graduates in procedural specialties (for example, cardiology) and specialties allied to surgery (anaesthetics, accident and emergency medicine, neurosurgery, otorhinolaryngology and orthopaedic surgery). The respondents who have chosen such career paths have been convinced of the benefit of the PhD in securing competitive specialist registrar posts for higher medical/surgical training. To our knowledge there are no outcome studies of established programmes that offer an integrated period of full-time research training leading to the PhD integrated within clinical courses at universities in mainland Europe. In 1994, University College London established an MB/PhD programme, and other integrated masters or PhD programmes have been put in place in Newcastle, Leicester, Manchester and

<table>
<thead>
<tr>
<th>Career pathway</th>
<th>Number of alumni</th>
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<tbody>
<tr>
<td>Clinical training (total)</td>
<td>35</td>
</tr>
<tr>
<td>FY1/2 posts</td>
<td>13</td>
</tr>
<tr>
<td>Specialty registrars</td>
<td>11</td>
</tr>
<tr>
<td>ACFs</td>
<td>6</td>
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<tr>
<td>Academic FY2</td>
<td>3</td>
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<tr>
<td>General practice</td>
<td>2</td>
</tr>
<tr>
<td>Industry/biotech</td>
<td>4</td>
</tr>
<tr>
<td>Senior directors</td>
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</tr>
<tr>
<td>NHS consultants</td>
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<tr>
<td>Full-time academic staff</td>
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<tr>
<td>University clinical lecturers</td>
<td>9</td>
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<tr>
<td>University senior lecturers</td>
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<td>Assistant professors</td>
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</tr>
<tr>
<td>Professors (chairmen)</td>
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<tr>
<td>Wellcome postdoctoral MB/PhD fellowships (ACF)</td>
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</tr>
<tr>
<td>Clinician scientists</td>
<td>6</td>
</tr>
<tr>
<td>Senior research fellows</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>80</td>
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ACF = academic clinical fellowship; FY = foundation year; MB = Bachelor of Medicine; PhD = Doctor of Philosophy.
Objective: This paper reviews the past 10 years of the MD-PhD programme at the University of Cambridge. The programme was established in 2002 to support the training of individuals who wished to combine advanced clinical training with opportunities for research. The programme is part of a wider initiative to enhance the training of clinical scientists in Britain.

Methods: The programme was evaluated using an online survey questionnaire that was sent to all former participants (n = 73). The survey explored the motivations of applicants, the nature of the programme, and the experiences of graduates.

Results: The survey was completed by 80% (73/80) of participants. The programme was highly regarded, with 95% of respondents reporting that it helped them achieve their goals.

Conclusion: The MD-PhD programme at the University of Cambridge is a successful model for training clinical scientists. It provides a unique opportunity for individuals to combine advanced clinical training with research, and is highly regarded by its alumni.
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