

# An MBPhD programme in the UK: the UCL experience

Gordon W Stewart

**ABSTRACT** – Traditionally, clinician scientists in the UK have been trained by a sequence of medical school, junior hospital posts, MRCP and research leading to a PhD. Thereafter they undertake a mixture of more senior middle-grade jobs leading to senior or lecturer consultant posts and beyond. Experience in the USA has shown how it is possible for young doctors to complete a PhD successfully while still at medical school, giving the graduate a combined MBBS and PhD qualification earlier in their career. UCL instituted such an ‘MBPhD’ scheme 18 years ago. The first graduates are now attaining chairs. Here, we review the experience of such a course in the UK context.

**KEY WORDS:** graduate medical education, physician-scientist, MBPhD

## History

Modern, science-based medicine can continue to deliver improved medical care and better outcomes only by effective research. Key to the prosecution of clinical research are investigators who are not only scientifically proficient but also clinicians. Such people have always been scarce. The dual training is lengthy and expensive; it is a minority interest among medical students.

In the UK and Europe, ‘physician scientists’ (medically qualified researchers) have traditionally trained by a well-trodden route in which individuals with a medical qualification (MBBS or MBChB in the UK) hold junior medical jobs until they achieve their postgraduate qualification (e.g. MRCP in the UK). After this, the individual breaks off into research aimed at a PhD qualification. Subsequently, the individual mixes research with further clinical training until the age of about 35, when he or she might be promoted to a senior research fellowship or a senior lectureship at consultant level. This pathway has served many people well and remains in common use to this day.

However, this process has its disadvantages. PhD completion rates for medically qualified graduates can be low, although the highly competitive and massively funded MRC fellowships are very successful (PM Stewart, P Maxwell, personal communication). The proportion of those embarking on PhDs after obtaining a postgraduate medical qualification who finally enter

a true research career is not known. Before embarking on a career in science, doctors are already habituated in the loud, urgent, hurried ways of clinical medicine, which are different from those of careful, rigorous science.

In the 1950s, American universities, led by Case Western Reserve in Ohio, devised courses in which a PhD would be undertaken much earlier, while the students were still at medical school. The idea was to take clever and ambitious young people, give them an arduous, vacation-free training in both high-quality clinical medicine and rigorous science, and produce a highly trained individual who would be well placed to advance the boundaries of biomedical knowledge.

This and other early pilots were successful. In the 1960s, the US federal government began funding such programmes, generously covering the majority of the stipend, fees and extra expenses (such as healthcare) for the eight years that it took to complete the US programme. These ‘medical scientist training programs’ (MSTPs) are funded through the National Institute of General Medical Sciences at the National Institute of Health (NIH).<sup>1</sup>

These American schemes have been outstandingly successful.<sup>2–4</sup> Entry is highly competitive; the contribution of US MDPHD graduates to medical research is by any measure very substantial. There are now about 75 MDPHD programmes in the US,<sup>5</sup> of which 46 are federally funded.<sup>6</sup>

## The UCL programme

The UCL MBPhD programme was started in 1994, shortly after another UK scheme at Cambridge.<sup>7</sup> At UCL, the student is appointed during his or her BSc year. There is an abbreviated first clinical year that begins in July soon after the BSc exams. This lasts for six months, during which the student receives instruction on the basics of clinical medicine. In January following enrolment, the student embarks on their PhD research, which continues for either 2 years 9 months or (more commonly) three years nine months. After the PhD, the student returns to clinical studies until graduation two years later.

At UCL, PhDs can be undertaken at UCL itself, at the National Institute for Medical Research (NIMR) at Mill Hill or at the laboratories of Cancer Research UK (CRUK) in London. In exceptional circumstances, students can undertake PhDs outside these institutions.

During the PhD, clinical tuition continues, usually out of hours. Upon completion of their PhD, the student very often maintains contact with his or her PhD laboratory.

Neither of the major research funders in the UK (the Medical Research Council and the Wellcome Trust) fund these schemes

---

Gordon W Stewart, professor of experimental medicine

Division of Medicine, University College London, London, UK

directly. The clinical part of the course is funded by student loans and NHS bursaries (as is also the case for non-MBPhD clinical students), but the PhD (stipend, fees, some running expenses) is supported financially by charitable funds (see 'Acknowledgements').

## Outcomes

We have enrolled a total of 107 students on to the UCL programme, of which 74 (70%) are men, a proportion that is reflected in both US and other European programmes.<sup>8, 9</sup> Of these, 60 have now graduated as MBPhD. A further five have dropped out of the PhD and have graduated as MBBS only. One who dropped out of his PhD in the early years completed another PhD after graduating with his MBBS. Of the remaining students, 31 are currently in the PhD stage and 12 have finished their research time and are now in the later stages of their clinical studies.

The students have chosen PhD topics that reflect UCL's research strengths: 27% of the projects were (or are) in neuroscience, neurology or psychiatry; 20% in immunology or infection; 12% in oncology; 10% in cardiovascular medicine, 9% in development; and the remainder in other subject areas.

Of the 60 MBPhD graduates, most are in or intending to follow careers in some form of internal medicine. Eleven (17%) are in surgical training; there are two psychiatrists, three paediatricians and two clinical geneticists.

Of the 37 most senior students who enrolled in the period 1994–9 (graduating roughly between 2001–7, Table 1), we have two professors, one National Institute for Medical Research (NIMR) group leader (all appointed in their 30s), seven consultants and two Wellcome postdoctoral fellows. Three others have completed post-doctoral research.

Of the junior graduates who enrolled in the period 2000–5 (a total of 32, graduating in the years 2007–11, Table 2), more than

**Table 1. Career outcomes of more senior MBPhD graduates.**

Year of entry	Student number	Present position	Speciality	Location
1994	1	Consultant	Ophthalmology	Epsom
	2	SpR	Immunology	King's College London
	3	Consultant	Radiology	Sydney
	4	Professor	Oncology	UCL/CRUK
	5	Consultant	Plastic surgery	Adelaide
1995	6	SpR	Infectious disease	Hammersmith
	7	Consultant	Pathology	Cologne
	8	Consultant	Neurosurgery	Cambridge
	9	Consultant	Cardiac electrophysiology	St Thomas' London
1996	10	Consultant	Neurology	Chichester
	11	Consultant	Child psychiatry	Dubai
	12	Wellcome MBPhD Fellow	Nephrology	Royal Free
	13	Programme Leader	Epigenetics	NIMR
	14	Wellcome MBPhD Fellow	Infectious disease	Liverpool
1997	15	ST	Plastic surgery	Plymouth
	16	Post-doctoral scientist	Cell biology/ITU medicine	NIH, USA
	17	ST	Paediatrics	South London
	18	ST	Plastic surgery	Cambridge, UK
	19	Professor	Neurology	Madrid
	20	ST	Hepatology	Royal London
1998	22	ST	Neurology	East London
	23	ACF	Clinical genetics	Guys
	24	SpR	Max-Fax surgery	UCLH
	25	ST	Anaesthetics	North London
	26	ST	Surgery	Kings
	27	ST	Surgery	Bristol
1999	28	ST	Neurology	London
	29	Post-doctoral scientist	Research	Portugal
	31	ST	Neurosurgery	Queen Square

CRUK = Cancer Research UK; NIH = National Institute of Health; SpR = specialist registrar ST = specialist trainee. Students 21 and 30 dropped out of their PhDs but have graduated MBBS. Student 21 completed a PhD after graduation.

half are in academic-type junior hospital positions (academic F1, academic F2 or academic clinical fellow (ACF)). One has a Wellcome postdoctoral MBPhD fellowship, another is a National Institute for Health Research (NIHR) Lecturer, another has a post-doctoral post in San Francisco.

It is invidious simply to count publications, but as of 7 April 2012, those who have been enrolled on the UCL MBPhD scheme have published 622 PubMed-accessible papers. These are listed in the 'Supplementary information' (available online). This list does not include book chapters and conference proceedings. A number of the publications have been of major significance in providing new insights into: the nature of Crohn's disease;<sup>10</sup> the role of interleukin 6 in cardiovascular disease;<sup>11</sup> the role of coagulation factors in fibrosis;<sup>12</sup> the nature of diverse somatic mutations in cancer;<sup>13</sup> fundamental aspects of pain;<sup>14</sup> the possible complications of gene

therapy;<sup>15</sup> the role of the amygdala in amnesia;<sup>16</sup> and gene silencing and infertility.<sup>17</sup>

## Discussion

Even though this programme has been running for 18 years, it remains immature by the standards of its US equivalents. Nevertheless, it is our opinion that it has been a success. The vast majority of past and present students are happy with their decision to undertake the course; many have already made major contributions to science; the students are usually highly regarded by lab supervisors, as clever committed PhD students; the majority of those in clinical training are keen to return to research if at all possible; many of the students and graduates are highly regarded in the hospital as clinicians; the PhD drop-out

**Table 2. Career outcomes of more junior MBPhD graduates.**

Year of entry	Student number	Post	Speciality	Location
2000	32	Registrar	Clinical genetics	Cambridge
	33	SpR	Acute medicine	NCTFS
	34	NIHR Clinical Lecturer	Infection	Infection and Public Health, UCL
	35	ACF	Microbiology	North Thames
	36	ACF	Psychiatry	North Thames
	37	Wellcome MBPhD Fellow	Neurology	Queen Square
	38	CMT	Medicine	NCTFS
2001	40	CMT	Haematology	North Thames
	41	Post-doctoral researcher	Paediatrics	San Francisco
	42	ACF	Medicine	North Thames
	43	Clinical Lecturer	Neurology	Oxford
	44	ACF	Paediatrics, neurology	GOSH/ICH
	45	ACF	Paediatric surgery	North Thames
	46	CMT	Medicine	London
2002	47	CMT	Medicine	NC Thames
	48	CMT	Medicine	North Middlesex
2003	49	FY1	Foundation	St Thomas'
	50	Academic FY2	Foundation	NC Thames
	51	ACF	Radiology	Cambridge
2004	52	Academic FY2	Foundation	NC Thames
	53	FY1	Foundation	UCL Clinical
	55	Academic FY2	Foundation	NC Thames
	56	Academic FY1	Foundation	NC Thames
	57	Academic FY2	Foundation	S Thames
	58	Academic FY2	Foundation	NC Thames
	59	FY1	Foundation	NC Thames
2005	61	FY1	Foundation	NC Thames
	62	Academic FY2	Foundation	NE Thames
	63	Academic FY2	Foundation	NE Thames
2006	64	Academic FY1	Foundation	S Thames
	65	Academic FY1	Foundation	NC Thames

ACF = academic clinical fellow; CMT = core medical training; SpR = specialist registrar. Students 39 and 60 dropped out of their PhDs but have graduated MBBS. Student 54 is still a clinical student.

rate is low; and there is every indication that a substantial number of the graduates are going to progress to positions of leadership and/or academic excellence.

A number of points distinguish MBPhD students from those doing simple 'intercalated' PhDs. Throughout the PhD they continue to be classed as 'clinical students', enabling them to attend clinical tuition, and (if they wish) to see patients in the casualty department and in the wards in their spare time. The clinical training and continuing hospital registration enables them to undertake clinically based projects that involve patient interaction. There is a strong group spirit within the cohort. They support each other in many ways, socially and professionally. We already have one married couple (and there will be more). The students are intensively mentored not only by the course tutor but also by many other faculty members.

Prof Patrick Maxwell, formerly at UCL, points out that this course produces 'a scientist who becomes a doctor' rather than 'a doctor who becomes a scientist', a potentially important distinction that emphasizes the basic outlook and philosophy of the trainee.

There is no suggestion that this or any other MBPhD programme should supplant the traditional academic training pathway in which a PhD succeeds graduation and postgraduate exams: rather, the MBPhD scheme allows those who are very keen on research at an early stage to undertake their PhDs while still at the 'student' stage. It is our opinion that these programmes are a valuable addition to the training opportunities for future clinical academics in the UK. They should be continued, extended and supported.

## Acknowledgements

This programme has been supported by many UCL academics and administrators, including the original founders, Professors AW Segal FRS, Neville Woolf and David Brenton; Professors David Katz, Patrick Maxwell, Mary Collins, Jane Dacre, Geraint Rees, Raymond Macallister, Charles Swanton MBPhD, James Turner MBPhD in later years; and Dr Peter Raven as Faculty Tutor. The course is run by Ms Sue Beesley. Ms Gaynor Jones in Medical School Administration has been invaluable. Drs Sally Leivers and Donna Brown at CRUK and NIMR have been generous in facilitating links between UCL and their respective institutions. The Programme has been funded at various times by The International Journal of Experimental Pathology, The Astor Foundation, The Rosetrees Trust, generous allocations from the UCL MRC DTA fund and the UCL Comprehensive Biomedical Research Centre, the British Heart Foundation, Glaxo-Smith-Klein, the Jean Shanks Fund, A\*Star (Singapore), the Sir Jules Thorn Trust, the Institute of Child Health and the Lord Amulree Fund. Studentships have been generously provided by NIMR, Mill Hill, UK and CRUK. Clinical teaching has been generously provided by Professor David Katz and by Drs Maddy Noursadeghi, Christian Hasford, Daniel Marks

MBPhD and Stavros Loukogeorgiakakis MBPhD. I thank Dr Peter Preusch at NIH for useful advice.

## References

- 1 Perkel J. Clinical science: research and repair. *Nature* 2011;476:361–3.
- 2 Brass LE, Akabas MH, Burnley LD *et al.* Are MD-PhD programs meeting their goals? An analysis of career choices made by graduates of 24 MD-PhD programs. *Acad Med* 2010;85:692–701.
- 3 Zemlo TR, Garrison HH, Partridge NC, Ley TJ. The physician-scientist: career issues and challenges at the year 2000. *Faseb J* 2000;14:221–30.
- 4 Ley TJ, Rosenberg LE. The physician-scientist career pipeline in 2005: build it, and they will come. *JAMA* 2005;294:1343–51.
- 5 Andriole DA, Whelan AJ, Jeffe DB. Characteristics and career intentions of the emerging MD/PhD workforce. *Jama* 2008;300:1165–73.
- 6 National Institute of General Medical Sciences. Medical Scientist Training Program (MSTP) Institutions, 2012. [www.nigms.nih.gov/Training/InstPredoc/PredocInst-MSTP.htm](http://www.nigms.nih.gov/Training/InstPredoc/PredocInst-MSTP.htm) [Accessed 30 October 2012].
- 7 Cox TM, Wakeford R. The MB PhD programme. Training to be a clinician-scientist in the UK. *J R Coll Physicians Lond* 1993;27:147–50.
- 8 Jeffe DB, Andriole DA. A national cohort study of MD-PhD graduates of medical schools with and without funding from the National Institute of General Medical Sciences' Medical Scientist Training Program. *Acad Med* 2011;86:953–61.
- 9 Kuehnle K, Winkler DT, Meier-Abt PJ. Swiss national MD-PhD-program: an outcome analysis. *Swiss Med Wkly* 2009;139:540–6.
- 10 Marks DJ, Harbord MW, MacAllister R *et al.* Defective acute inflammation in Crohn's disease: a clinical investigation. *Lancet* 2006;367:668–78.
- 11 Swerdlow DI, Hingorani AD, Casas JP, IL6RMR-Consortium. The interleukin-6 receptor as a target for prevention of coronary heart disease: a mendelian randomisation analysis. *Lancet* 2012;379:1214–24.
- 12 Scotton CJ, Krupiczkoj MA, Konigshoff M *et al.* Increased local expression of coagulation factor X contributes to the fibrotic response in human and murine lung injury. *J Clin Invest* 2009;119:2550–63.
- 13 Gerlinger M, Rowan AJ, Horswell S *et al.* Intratumor heterogeneity and branched evolution revealed by multiregion sequencing. *New Engl J Med* 2012;366:883–92.
- 14 Mannion RJ, Costigan M, Decosterd I *et al.* Neurotrophins: peripherally and centrally acting modulators of tactile stimulus-induced inflammatory pain hypersensitivity. *Proc Natl Acad Sci U S A* 1999;96:9385–90.
- 15 Bokhoven M, Stephen SL, Knight S *et al.* Insertional gene activation by lentiviral and gammaretroviral vectors. *J Virol* 2009;83:283–94.
- 16 Strange BA, Hurlemann R, Dolan RJ. An emotion-induced retrograde amnesia in humans is amygdala- and beta-adrenergic-dependent. *Proc Natl Acad Sci U S A* 2003;100:13626–31.
- 17 Turner JM, Mahadevaiah SK, Fernandez-Capetillo O *et al.* Silencing of unsynapsed meiotic chromosomes in the mouse. *Nat Genet* 2005;37:41–7.

**Address for correspondence:** Prof GW Stewart,  
Division of Medicine, University College London, Rayne  
Building, University Street,  
London WC1E 6JJ.  
**Email:** G.stewart@ucl.ac.uk