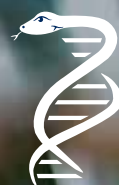




The Academy of Medical Sciences Review 2006

FMedSci



The Academy of
Medical Sciences

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The Academy's objectives and ambitions for medical science



The Academy of Medical Sciences promotes advances in medical science and campaigns to ensure these are converted as quickly as possible into healthcare benefits for society. Our 850 Fellows are the UK's leading medical scientists from hospitals and general practice, academia, industry and the public service.

Our Fellows are central to all we do. The excellence of their science, their contribution to medicine and society and the diversity of their achievements are reflected throughout this review.

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, including the unique opportunities for research afforded by the NHS, encourage the implementation of new ideas and solutions – often through novel partnerships, promote careers and capacity building and help to remove barriers to progress.

Throughout all our work the Academy strives to demonstrate our key attributes of **excellence, independence, leadership, diversity and flexibility**.

Modern medicine requires a multi-disciplinary approach – both in research and in the formation of public policy. The Academy offers an integrated and independent national resource with the expertise and authority to deal with public policy issues in healthcare in their widest scientific and societal contexts.

As we approach our tenth anniversary we have clear goals to guide our work, and a well-researched and considered programme to reach our objectives. At the heart of our strategy for the next five years are these objectives:

1. To encourage the pursuit of internationally competitive medical science and the translation of that knowledge, and its associated technologies, from the laboratory bench to the delivery of healthcare.
2. To influence the development and implementation of national policy in matters of medical science and healthcare.
3. To engage with the public to build confidence in the practice of medical research and to address public concerns.
4. To attract and develop the brightest individuals to careers in biomedical science.
5. To contribute to developments and improvements in global health.

A message from our President

Professor
Sir Keith Peters
FRS PMedSci

As my term of office draws to a close I reflect on how much has changed during the Academy's short life. I have no doubt that UK science in general, and medical science in particular, is now healthier than it was a decade ago. In the wake of John Bell's report *Strengthening Clinical Research*, the creation of the UKCRC and the Walport report¹ on clinical academic careers are major gains for our community.

There is now a general recognition by government of the strategic importance of medical science to the UK, as a contributor to the health of our citizens and others, especially in the developing world, and as key to the success of our health-related industries, notably pharma, biotechnology and medical equipment. The Academy's focus on translating medical science into clinical benefit puts us at centre stage of national policy debates.

The Academy welcomed the review of UK health research funding undertaken by Sir David Cooksey and supported the underlying principle of creating a holistic UK health research and development system with the appropriate leadership, governance, resources and culture. No other country enjoys the outstanding opportunity for clinical research represented by the NHS which, if its potential is realised, offers an unparalleled advantage for UK plc. However this optimism must be guarded. The shift towards the delivery of healthcare by the private sector, with no duty to support teaching and research, represents a risk that may deny UK academic medicine this major competitive advantage.

The Academy is in good shape. We have a small but outstanding team at 10 Carlton House Terrace and I know that everyone who has worked with them will join me in expressing great thanks for everything they do. As President, I have had excellent support from my colleagues on the Academy's Council. I want to express my particular appreciation to Colin Dollery, who stood down as Treasurer in 2005, and to Patrick Vallance who served as Registrar until July 2006.

I hand over to John Bell with my enthusiasm for the work of the Academy undiminished. I believe we have fulfilled the brief set out for us by the Academy's founder President, Peter Lachmann, to become the leading voice for academic medicine in the UK. Eight years ago the Academy did not exist. It is hard now to imagine medical science without it.

¹ Medically and dentally qualified academic staff: Recommendations for training the researchers and educators of the future. Published by the UKCRC and MMC March 2005.



Executive Director's report



Mrs Mary Manning
Executive Director

For the Academy of Medical Sciences, now eight years old, success has come in many guises: the number of published policy studies and their evident impact on UK national healthcare policy, the election of excellent medical scientists to the Fellowship from across the academic spectrum, the development of forceful and effective strategic partnerships throughout the scientific community and the continued expansion of the Academy's operations, together with an enhanced reputation nationally and internationally.

We – the Fellows, Officers, Council and staff – have worked hard to achieve this. In this document I have the pleasure of highlighting specific achievements and thanking the very many people who have given their time and expertise to the Academy. I would also like to thank our many generous donors and sponsors. Their commitment to the promotion of medical science for public benefit, and their support for the work of this Academy, has been invaluable.

Public policy in medical science and healthcare

The Academy is playing an increasingly pivotal role in the formulation of policy and funding decisions that underpin academic medicine in the UK. Two years ago we took a strategic decision to broaden the Fellowship in order to expand the breadth of expertise and thus we have elected lawyers, science writers, ethicists, mathematicians, industrial chemists and economists to the membership. In addition we have actively sought strategic partnerships that cut across traditional disciplinary boundaries to promote and champion key policy issues. The success of this strategy is evident from the comments of colleagues on page 10.

In the past two years, the Academy has addressed a number of major policy issues with profound societal implications: *Safer Medicines* (November 2005), produced by experts drawn from industry and academe; *Personal data for public good: using health information in medical research* (January 2005), highlighting the vital role of patient data in contributing to scientific advances in healthcare;

Testing antibody therapies, an independent commentary on the scientific issues raised by the TGN1412 clinical trial (April 2006); and an international symposium, with speakers drawn from the USA, Canada, Australia and Europe in June 2005 to examine the socio-economic benefits of medical research. This resulted in the publication *Medical research: assessing the benefits to society* (June 2005).

Much of the public policy debate over the autumn and winter of 2005 was dominated by the possibility of an influenza pandemic. A private meeting for Fellows with the Chief Medical Officer, Sir Liam Donaldson FMedSci, was convened for the purpose of improving UK preparedness in the face of such a threat, and the discussion contributed to our response to the House of Lords Science and Technology Select Committee inquiry into 'Pandemic Influenza'. This is also the subject of a joint study with the Royal Society *Pandemic influenza: science to policy* (November 2006).

The recent formation of the All Party Parliamentary Group on Medical Research has provided a forum for sharing advice and information with MPs and Peers. The Academy's 2005 work on the Mental Capacity and Human Tissue Bills illustrated the benefits of using Fellows to provide evidence in support of policy positions and of initiating strategic collaborations with other organisations; in these instances the MRC, Wellcome Trust, Cancer Research UK, Association of Medical Research Charities and the Royal College of Physicians.

From time to time the Academy undertakes specific commissions from government. 'Brain science, addiction and drugs', was commissioned by the Department of Health in August 2005. This project is supported by the Office of Science and Innovation with funds to cover a major exercise in public dialogue, which we welcome. This new policy study, chaired by Sir Gabriel Horn FRS, will report in 2007.

Industry Forum

Collaboration with industry is one of the many crosscutting themes that pervade the Academy's work. It is also addressed through the Industry Forum, which brings together biomedical scientists from academe and industry and currently has 28 active members. Dr Tim Rolph, Discovery Site Head, Pfizer, delivered the 2006 Forum lecture: *The human genome, realising pharmaceutical opportunities*. A symposium on *Experimental Medicine* in April 2006 also explored the potential of experimental medicine to enable a better understanding of human disease, its diagnosis and prognosis, and therapeutic interventions.

Education, training and research

A strong cadre of scientists and clinicians is critical to ensuring that the UK continues to engage in the highest quality research and teaching at national and international levels. A Department of Health grant has enabled the Academy to develop a mentoring programme to assist Clinician Scientist Fellows with their personal and professional development and the Academy's expertise and strong reputation in this area has attracted interest from other funding bodies. Work on our dedicated careers website has continued throughout the year.

The Academy has continued to oversee and support the progress of the Fellows funded by The Health Foundation, the Allgemeines Treuunternehmen Foundation and the Primary Immunodeficiency Association. In 2005, the non-clinical careers committee, chaired by Professor Keith Gull FRS FMedSci, undertook a review of non-clinical research fellowships in the biomedical sciences, *The Freedom to Succeed* (July 2005). The report has already made an impact on the policies of major funders.

The Academy office

The staff, only 12 in number, bring considerable talent and energy to the work of the Academy. Their dedication, commitment and willingness to take on increasingly demanding activities underpin our success. We are grateful for the generous support of the British Academy in whose building we reside. We bade farewell to our Treasurer Sir Colin Dollery FMedSci who retired from office in 2005 and Registrar Professor Patrick Vallance FMedSci in July 2006. Both brought a strong reforming agenda to the Academy and inspired many novel activities.

The Academy's President, Sir Keith Peters FRS PMedSci, will stand down in November 2006. Only the second President in our short history, Keith has successfully led the Academy to its current position as a leading advisor to the country on medical science issues. The Academy has greatly benefited from his considerable experience, shrewd judgement, and sound advice.

The future

A new 5-year strategic plan was published in June 2006 reaffirming the Academy's commitment to the promotion of advances in medical science for society. Two new goals were identified: the potential for the Academy to look beyond the UK and Europe to contribute to the development of global health, and the need to engage with the public to build confidence and participation in the practice of medical research. The Academy has already built strong links throughout Europe thanks to its involvement in the work of the Federation of European Academies of Medicine; the inclusion of global health in the strategic plan represents a significant expansion of Academy effort.

The strength of our Fellowship

Academy Fellows are selected primarily for their outstanding contribution to the advancement of medical science, for their innovative application of existing science knowledge, or for their conspicuous service to medical science and healthcare.

The diversity of their talent and expertise ensures that the Academy is excellently placed to bring authoritative opinion and practical guidance to complex issues in medical science and healthcare. The breadth and depth of this expertise is illustrated in these profiles of eight new Fellows, some of the 80 admitted during 2005 and 2006.

Janet Darbyshire's work has had a major impact on global health, particularly through her involvement in the design and execution of clinical trials and epidemiological studies in TB, HIV and AIDS. Professor Darbyshire's work in the UK and in the developing world has established her as one of the world's leading epidemiologists. She had a leading role in the development of the National Cancer Research Network (NCRN), which has led to a marked increase in recruitment to clinical trials to improve the management of cancer in the UK. Since 2005 she has been Co-director of the UK Clinical Research Network. She is also Director of the MRC Clinical Trials Unit and Professor of Epidemiology at University College London.

Shoumo Bhattacharya, Professor of Cardiovascular Medicine at the University of Oxford, has applied the skills of molecular and cell biology to increase our understanding of congenital heart disease (CHD). CHD is a major cause of morbidity and death in childhood in the West. Professor Bhattacharya led the team that used a number of innovative approaches, such as MRI imaging, to identify genes and proteins where mutations can result in congenital heart malformations, and established a link between CHD and left-right patterning. His work has led to a new understanding of these diseases at the level of clinical and molecular genetics.

Polly Roy is Professor of Virology at the London School of Hygiene and Tropical Medicine. Her research on the structure and biology of multi-shelled viruses and emerging infectious diseases has had a significant impact on healthcare and economics. Professor Roy instigated the first complete examination of a distinct group of viruses, called orbiviruses, at the molecular level, a field she pursues to the present day. The work has identified the structures and enzyme activities necessary for virus success and has opened the way to improved diagnosis, vaccines and more effective drug design for viruses of both human and animal origin.

Neil Ferguson, Professor of Mathematical Biology at Imperial College London, has made a major contribution to our understanding of how new diseases spread and the potential risks they pose to human and animal populations. In 1996, Professor Ferguson developed the first back-calculation model of the BSE epidemic, and has since built a major reputation in the real-time modelling of epidemics. His mathematical models played a major role in shaping the scientific advice to government during the foot and mouth epidemic of 2001. More recently, his research has been used by governments across the world in preparing for a possible new flu pandemic. He also works on new variant CJD, bioterrorist agents and pathogen evolution.



Thomas Jessell of Columbia University Medical Centre is one of a number of Academy Fellows based at leading medical research establishments overseas. Professor Jessell's work on the spinal cord has defined the key mechanisms that specify the identity of neurons, the patterning of their axonal projections, and the formation of selective synaptic connections. His current portfolio includes research into the development of neural circuits for simple reflex behaviour. Professor Jessell's findings have had profound implications for scientists' ability to direct the generation of motor neurons from stem cells.

Rosalind Smyth is a leader in research into the health of children. As Professor of Paediatric Medicine at the University of Liverpool, her major programme of research into the disease of bronchiolitis in infants is providing important information about the immunopathology of this condition, which will be essential in the development of effective new treatments. Professor Smyth has a long-standing interest in the development of safe and effective medicines for children; she chairs the Commission on Human Medicines' Paediatric Expert Advisory Group and is Director of the UK Medicines for Children Research Network.

Alexander McCall Smith is Emeritus Professor of Medical Law at the University of Edinburgh. In addition to being an internationally renowned author he is one of the world's leading medical lawyers and an outstanding scholar in the fields of law and medical ethics. Much of his research has been concerned with exploring the medico-legal aspects of criminal law but, unusually for a British lawyer, since countries' legal systems differ widely, his work has been acclaimed internationally and applied in many parts of the world, particularly in the Commonwealth.

Sir Gregory Winter is a pioneer of protein engineering and is responsible for the development of technologies used by the United States Food and Drug Administration to approve the majority of therapeutic monoclonal antibodies. A scientist, inventor and entrepreneur, his work with Herman Waldmann FMedSci led to the first clinical use of a genetically engineered therapeutic antibody, Campath®, and his role in the founding and science of Cambridge Antibody Technology led to the first human therapeutic antibody, Humira®. Sir Gregory's career is a powerful example of medical science combining with business acumen to benefit patients with innovative treatments. He is currently Head of Division, Protein & Nucleic Acid Chemistry Department MRC Laboratory of Molecular Biology.

(Clockwise from top left)

Janet Darbyshire OBE FMedSci

Shoumo Bhattacharya FMedSci

Polly Roy FMedSci

Alexander McCall Smith FRSE FMedSci

Sir Gregory Winter CBE FRS FMedSci

Rosalind Smyth FMedSci

Neil Ferguson OBE FMedSci

Thomas Jessell FRS FMedSci

How we work



The Academy promotes discussion and provides advice on medical science in a variety of ways.

Throughout the year the Academy runs a number of symposia, workshops and conferences, as well as world-renowned lectures. These events provide unique opportunities to bring together the leading figures in the medical community with relevant sectors of society to progress discussions on the important medical issues of our time.

Each year the Academy carries out a number of in-depth, long term studies that culminate in the production of written reports representing the discussions and conclusions of an expert study group. These reports and recommendations are submitted to specific individuals and organisations with appropriate follow up work undertaken to ensure a genuine impact on the nation's healthcare.

The Academy responds to emerging and topical issues with position papers, expert statements and comment released through the media in a timely

fashion. These fast-moving issues are addressed at short-notice by mobilising small working groups for a one-off meeting to produce briefing notes.

The Academy also supports the career development of high calibre young scientists in highly practical ways through the work of two standing committees.

All of our projects are overseen or conducted by a Fellow of the Academy, or senior public figure, appointed by the Academy's Council. The Council endorses all policy statements or recommendations before publication.

Projects may arise from recommendations from the Academy's Council and Fellowship, as well as in response to consultations from government, Parliament and other relevant bodies. Many of our projects are undertaken in collaboration with other UK and international bodies such as charities, research funders, or industry.

OFFICERS

Five Honorary Officers provide strategic advice to the Academy:

President, **Sir Keith Peters** FRS PMedSci
Emeritus Regius Professor of Physic in the School of Clinical Medicine, University of Cambridge

Vice-President, **Sir John Skehel** FRS FMedSci
Former Director of the National Institute for Medical Research

Vice-President, **Sir Michael Rutter**
CBE FRS FBA FMedSci
Professor of Developmental Psychopathology, Kings College London

Treasurer (to Nov 05),
Sir Colin Dollery FMedSci
Senior Consultant, GlaxoSmithKline Pharmaceuticals

Treasurer (from Nov 05),
Professor Ian Lauder FMedSci
Dean, Leicester Warwick Medical School

Registrar (to July 06),
Professor Patrick Vallance FMedSci
Senior Vice President, Drug Discovery,
GlaxoSmithKline Research and Development

Registrar (from July 06),
Professor Patrick Maxwell FMedSci
Professor of Nephrology, Imperial College London

COUNCIL

A Council of 23 members including the five Honorary Officers, all of whom are elected from the Fellowship, oversees the work of the Academy. Council may, from time to time, co-opt additional Fellows to provide balance or expert advice.



Progress through partnership

Opposite page
clockwise from top left

Sir David King FRS

Dr Tachi Yamada FMedSci

Dr Tim Rolph

Dr Evan Harris MP

**The Rt Hon The
Lord Jenkin of Roding** FRS

Professor Sally Davies FMedSci

The Academy believes it is essential that, whenever practical, the medical science community speaks with a coordinated voice on key policy issues. We have forged productive relationships with a large number of individuals and organisations. This is what a few of our partners have said about working with the Academy.

Sir David King FRS

Chief Scientific Adviser to HM Government

“As with the other National Academies, the government looks to the Academy of Medical Sciences for its expert and independent advice on pressing policy challenges. I am very pleased to be working with the Academy in the area of brain science, addiction and drugs and await with great anticipation the outcomes of the Academy’s deliberations on how to take forward policies and research in this important area. I am particularly grateful that the Academy will be breaking new ground by including within its study an extensive programme of public dialogue and engagement supported by the DTI’s Sciencewise programme. I welcome the Academy’s commitment to this, and look forward to strengthening the relationship.”

Professor Sally Davies FMedSci

Director General for Research and Development,
Department of Health

“The Academy has over the last few years developed a key role in British medicine and science. The Department of Health values both the independence and high quality of advice given by the Academy and its fellowship. We look forward to continued partnership working.”

The Rt Hon The Lord Jenkin of Roding FRS

“When the AMS was set up in 1998, I welcomed it warmly. Medical science needed a distinctive voice to speak for research across the board, unconstrained by the inevitable interests that colour the policies of other bodies in the field. I have not been disappointed. Both from my standpoint as the recent Chairman of the Foundation for Science and Technology, and as a Member of the House of Lords with an interest in medical research, I have been very impressed by the wisdom of the Academy’s pronouncements on a variety of matters; in particular, I welcomed the note of caution it has injected into the argument about the proposed merger of the MRC’s activities and the NHS clinical research activities. We need that distinctive voice to be heard and to be listened to in places where decisions are taken.”

Dr Tachi Yamada FMedSci

President, Global Health Program, Bill and Melinda Gates Foundation

“The Academy has a vital role to play in the advancement of medical science. As a learned and neutral party it is able to articulate national priorities in research, foster collaborations between the private and public sectors and most importantly provide unbiased analyses of complex medical issues to government and the general public. Over its short history the Academy has succeeded in all of these activities and gained a global reputation for intelligence and impact.”

Dr Tim Rolph

Pfizer Global Research and Development

“Pfizer is a committed supporter of the Academy of Medical Sciences. It recognises the value of the Academy in bringing the pharmaceutical, biotechnology and biomedical research community together, to work on areas of common interest, for example, drug safety evaluation and translational biomarkers to bridge from the lab to man.”

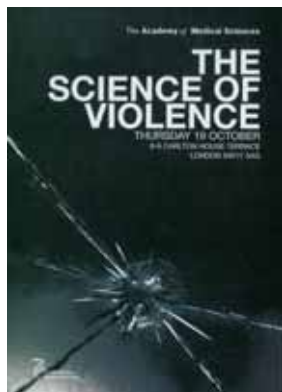
Dr Evan Harris MP

“It is very important that the scientific community, including the Academy, continues to make its voice heard in public policy debates, especially when we are facing a very worrying increase in the lobbying activity of NGOs who are not only non-scientific but positively anti-scientific. In the biomedical field the stakes are very high.

“The Academy of Medical Sciences has shown that it can strike the right balance between timeliness of its contributions and the evidential rigour of what it says. Politicians and the media need an effective source of advice and information drawn from those with expertise and experience in evaluating a body of peer-reviewed scientific evidence. The Academy fulfils that role with energy.”



Celebrating science



The Academy is passionate about celebrating the achievements of medical science. Through our prestigious award lectures, symposia and workshops the Academy communicates the latest biomedical research to a wide variety of audiences.

LECTURES

Jean Shanks Lecture

2004: Sir Philip Cohen FRS FRSE FMedSci
Protein kinase inhibitors; the major drugs of the 21st century?

2005: Professor Kim Nasmyth FRS
How do we inherit the right number of chromosomes?

2006: Dr Tachi Yamada FMedSci
Challenges and opportunities in global health

The Raymond and Beverly Sackler Lecture

2005: Sir Aaron Klug OM FRS HonFMedSci
Towards therapeutic applications of engineered zinc finger proteins

2006: Sir Michael J. Berridge FRS FMedSci
Calcium signalling in health and disease

International Health Lecture

2004: Dr Bernard Moss
Understanding Poxviruses: Jenner, genomics and genetic engineering

2005: Sir Gustav Nossal AC CBE FAA FRS
Global health advances in a troubled world: 2005 a turning point?

Industry FORUM Annual Lecture

2005: Professor Alex Markham FMedSci
Cancer research in the UK: areas of optimism and concern

2006: Dr Tim Rolph
The human genome: realising pharmaceutical opportunities

Industry FORUM Medical Science Briefings

Dr Robin Lovell-Badge FRS FMedSci
Progress and prospects for stem cell research

Professor Stafford Lightman FMedSci
and **Professor Simon Wessely** FMedSci
Is stress real?

SYMPOSIA

Public trust and biomedical research

Diseases of the developing world

The science of violence

Experimental medicine

Drug discovery

Cancer biomarkers and imaging

Valuing health research: assessing the benefits to society

Legal symposium: personal data for public good
Health, happiness and social status

WORKSHOPS

Detection and identification of infectious diseases

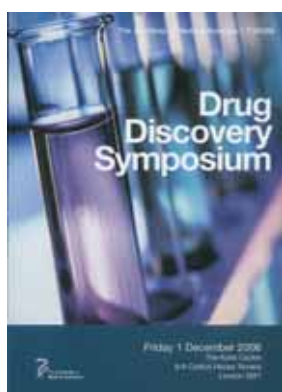
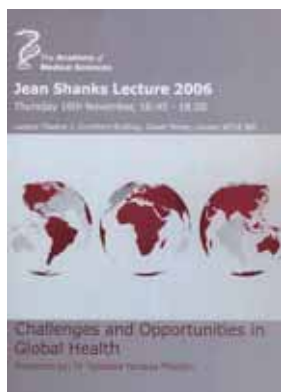
Led by **Sir John Skehel** FRS FMedSci

Health service review

Organised in collaboration with the NHS Confederation's Health Services Research Network. Led by **Professor Sir Andrew Haines** FMedSci

Cooksey Review workshop

Organised in collaboration with HM Treasury and the Royal Society



Our reports

RECENT REPORTS

The Freedom to Succeed

Chair **Professor Keith Gull** CBE FRS FMedSci

Microbial Challenge Studies

Chair **Professor Richard Moxon** FMedSci

Safer Medicines

Chair **Dr Geoffrey Schild** FMedSci

Testing Antibody Therapies

Chair **Professor Patrick Vallance** FMedSci

Medical Research: assessing the benefits to society (a report of the UK Evaluation Forum)

Chair **Professor Martin Roland** CBE FMedSci

Personal Data for Public Good: using health information in medical research

Chair **Professor Robert Souhami** CBE FMedSci

CONSULTATION RESPONSES

Human Tissue Authority and Department of Health, Human Tissue Act

Chair **Professor Sir Nicholas Wright** FMedSci

Research Assessment Exercise 2008: Panel Criteria and Methods

Chair **Professor Peter Rigby** FMedSci

Department of Health consultation on the Human Fertilisation and Embryology Act

Chair **Dr Anne McLaren** DBE FRS FMedSci

NPSA/COREC, Implementing the Recommendations of the Report on the Operation of the NHS

Chair **Professor Patrick Vallance** FMedSci

Department of Health, Best Research for Best Health: a new national health research strategy

Chair **Sir Keith Peters** FRS PM edSci

Nuffield Council on Bioethics, Public Health: ethical issues

Chair **Professor Michael Rutter** CBE FRS FMedSci

FUTURE REPORTS

Brain Science, Addiction and Drugs

Chair **Professor Sir Gabriel Horn** FRS

Pandemic Influenza

Chair **Sir John Skehel** FRS FMedSci

Systems Biology

Joint Chairs **Sir Colin Dollery** FMedSci and **Professor Richard Kitney** FREng

The Use of Non-Human Primates in Medical Research

Chair **Professor Sir David Weatherall** FRS FMedSci

Non-experimental Methods

Chair **Sir Michael Rutter** FRS FBA FMedSci

Reports and consultation responses are available on the Academy website www.acmedsci.ac.uk



The articles on the following pages highlight some of our recent reports and work programmes

Advancing medical science and influencing policy



Professor Linda Partridge
CBE FRS FRSE FMedSci

Linda Partridge is
Professorial Fellow and
Weldon Professor of
Biometry in the Department
of Biology at University
College London

Linda Partridge discusses how the work of Academy Fellows is transforming our understanding of the ageing process.

The greatest challenge to medical scientists in the new century is to achieve a greater understanding of the ageing process and the diseases of old age. Greater longevity must be matched with an increased quality of life in old age, not least if healthcare systems are to survive the increasing demands that an elderly population places upon them. Research into ageing makes very good economic sense.

Academy Fellows are involved in a number of major research projects based at some of the UK's leading centres for the study of ageing. Our work seeks to ensure that we don't just live longer – but that we live healthier.

At the start of the last century, the average life expectancy in the UK was 47. By the beginning of the new millennium, that had risen to 76 for men and 81 for women. For both genders, life expectancy has risen by more than five years in the last 20. By 2100, studies suggest that most human beings in the developed world can expect to live to 100.

That these figures have risen so remarkably is a great tribute to the achievements of medical science in the twentieth century. But society's successes in tackling infectious diseases have in turn uncovered a range of age-related chronic diseases that were far less of an issue for our great-grandparents.

It is also interesting to note that, despite the glaring national demographic, not all medical schools have an academic department for the medicine of ageing. I never cease to be amazed by how few trainee GPs go through a geriatric rotation, even though, in many cases, the majority of their patients will be elderly.

We know that, as we get older, a bewildering number of changes take place in the body, with proteins, DNA and lipids accumulating multiple forms of damage. Such damage can lead to pathology in almost all tissues, and different types of pathology in any one tissue. For most of the twentieth century, ageing was viewed not as one process, but as lots of processes with many different causes.

We are coming to understand that the processes which may significantly affect our health in old age may have their origins very early in our lives – even before birth. Indeed, a good way of improving your quality of life in old age may be to choose your parents carefully and look after your mother's health before you were born! We are increasingly understanding the long-term effects that smoking and high-calorie diets have on mothers and their unborn children.

The work of my team at University College London is concentrating on building our understanding of the ageing process at the genetic level. Studies on the genes of first nematode worms, then the fruit fly, and now rodents are suggesting – remarkably – that mutations in single genes that encode components of the insulin and insulin-like growth factor signalling pathways seem to reduce the amount of ageing-related damage that occurs in cells and tissues and to extend healthy life-span.

While this research may increase our life-span, its true value lies in the way it is helping us to understand how ageing acts as a risk factor for so many of the major killers: heart disease, cancer and dementia. Extension of lifespan by alterations to insulin signalling seems to be accompanied by a delay in the onset of diverse ageing-related diseases. If many of the illnesses of old age have their basis in shared features of the normal ageing process, it may also be possible to develop a common cure. The exciting next stage will be to see how these findings in animals translate to humans.

The Academy is working to move research into ageing further up the government's agenda, and to increase the understanding of policy makers. In our response to a House Lords Science and Technology Select Committee Inquiry into scientific aspects of ageing, the Academy called for a joined-up national programme that co-ordinates both funding and research strategy into healthy ageing. We also suggested ways in which clinical trials and population based studies might be improved. The NHS offers very great opportunities for research into aging that must be harnessed.



Professor Linda Partridge's laboratory work is seeking to understand the mechanisms of ageing.

Building trust in science



Professor Robert Souhami
CBE FMedSci

Professor Souhami was
Director of Clinical Research
and Training at Cancer
Research UK.

Robert Souhami highlights the Academy's ongoing role in the regulation of medical research.

The UK has long been a world leader in population based research. This form of research often uses data in health records and databases, usually collected for clinical care. It is sometimes the only means of obtaining data on treatment outcomes, potential environmental causes of disease and on social and societal factors in health. In recent years, the UK has seen a change in attitudes towards the use of personal data, and medical research has been affected by new legislation designed to protect privacy and confidentiality.

Wherever possible such data are only used in medical research with the consent of patients or in fully anonymised form. Obtaining consent may be difficult or impossible because the data may have been collected long ago and patients moved on. Complete anonymisation sometimes leads to loss of important information and the ability to cross-check data.

In spite of the exceptional advantages the NHS provides in terms of population coverage, the UK has disadvantaged itself by a combination of conservative interpretation of the new laws, and by complexity and inconsistency in research governance. In fact, the law specifically allows for research using personal data without consent or full anonymisation, provided it is demonstrably in the public interest and that the risks to individuals are low.

Public perception of the balance between risk and benefit is largely unresearched. There is likely to be a considerable difference in sensitivity concerning the research use of data regarding hypertension, compared with data about sexually transmitted disease. We need to know more, and to avoid assumptions about what the general public, patients and their relatives think.

At present there are numerous regulatory bodies that may comment on research proposals. These are the R&D offices of hospital and Primary Care Trusts, the Office of the Information Commissioner and Ethics Committees. There is also the Patient Information Advisory Group (PIAG) established under the Health and Social Care Act specifically to advise on research

proposals of this type. Other bodies issue guidance even though they are not directly involved in the assessment of research proposals.

Concerns that research was being impeded led the Academy to establish a working group to inquire into the present position and to make recommendations. *Personal Data for Public Good: using health information in medical research* (June 2006) has helped to influence the climate of opinion about the regulation of this research.

The working group recommended that the law should be regarded by those involved in research governance as permissive of the use of personal data without consent or anonymisation, provided that the risks were small and in proportion to the likely benefit. There should be a simplified scheme of assessment of research proposals with clear guidance on the approval process. Good practice guidance should be developed concerning the need for consent, anonymisation and data security. PIAG should change the way in which its committee operates to assist research, without compromising the public interest. There should be research on specific aspects of public perception of research using personal data, using representative populations in well-designed studies. The UK health departments should develop public awareness programmes concerning the purpose and value of this research within the NHS. Finally, those responsible for the establishment of electronic healthcare records, which offer such promise for population research, should work with the research community to ensure research needs are incorporated in the programme.

In making these recommendations, the working group suggested mechanisms whereby they might be put into effect. Progress has followed. A research advisory committee has been established to assist the development of electronic health records. The UK Clinical Research Collaboration has accepted the task of developing good practice guidance by its members. Major research funders have agreed to finance research into public perception. The Academy will continue to work constructively with its partners to support this research ensuring that it is conducted to the highest standards, with the full participation of the public.



Professor Robert Souhami highlights how the storage and use of personal medical data is a key issue of trust between researchers and the public.

Working in partnership with industry



Professor Patrick Vallance
FMedSci

Patrick Vallance is Senior Vice President, Drug Discovery at GlaxoSmithKline, having been head of the Division of Medicine at UCL until earlier this year. He served as Registrar of the Academy from 2003 until 2006.

Patrick Vallance describes how representatives of business and academia worked together to tackle the challenge of developing safer medicines.

Developing drugs that are both safe and effective is an ongoing challenge; drugs that bring genuine benefit will always carry some degree of risk and society is becoming increasingly risk averse. Couple this with the feeling that the science of drug safety has not always kept pace with advances in other areas of biomedical science and it seems that change is inevitable. It was with this in mind that the Academy's Industry Forum, which brings together leading scientists from academic medicine, the pharmaceutical industry and regulatory and funding bodies, undertook a study into safer medicines, attempting to explain the risks involved and approaches to minimise them.

The Academy's Industry Forum provided instant access to a wide range of expertise and different perspectives ranging from molecular toxicology through epidemiology to the use of electronic patient records to monitor drug effects. The working group remit was to identify practical measures to improve drug safety and where possible achieve consensus around the scientific priorities. In drafting the report a recurring theme was partnerships – between industry, academia, regulatory bodies and the public. It was clear that all parties need to be engaged if we are to move to the more rapid introduction of effective and safe medicines.

The *Safer Medicines* (November 2005) report highlighted pre-competitive sharing of information as a significant area to improve drug safety. Much of the preclinical and clinical safety data could be shared to create a very significant resource for predictive toxicology. This is a huge task, and one that will require more than just UK Industry and academia forming partnerships, and there was a clear message that we need to engage with our sister academies to push things forward on an international front. At the population level it became clear that the electronic patient record could become one of the major tools for monitoring drug safety and that the UK has a potential major advantage in this respect. We must use our electronic health system for patient safety analysis and ensure that a properly constructed electronic patient records database is enabled for research use.

The initial report, which was a large undertaking involving many sub-groups working over many months, has triggered a number of specific actions that should benefit patients. However, this mammoth undertaking was soon followed by a real safety crisis that need an unusual Academy response – the events at Northwick Park involving a super-agonist monoclonal antibody. The Academy was able to draw together a group of experts, some of whom had been involved in the *Safer Medicines* report, who were expert in antibodies and immune responses. The group's remit was: to consider the potential role of antibody therapies as treatments; to identify potential safety hazards unique to the assessment of antibody therapy; and to provide a framework for further steps to ensure the safe introduction of new antibody therapies. It was interesting to see how the Academy was able to get the right group of scientists together at short notice and produce a concise, clear and constructive report in record time. This report made a significant contribution to the Medicines and Healthcare products Regulatory Agency inquiry and highlights the Academy's ongoing commitment to the development of safer medicines.

Underlying all of this work is a need to foster greater public engagement on drug safety and to share understanding of the risks, benefits and assumptions surrounding drug development and delivery. Industry and academia should recognise the need to involve, inform and engage the public. How we present information is vital and we should strive towards some standardised way of presenting the data.

Our *Safer Medicines* report is one step in a longer-term strategy; the object is to advance the progress of safe and effective new drugs for the benefit of all patients. The Academy will continue to build links with interested parties in taking forward the present recommendations and to support, where appropriate, the initiatives of other bodies.



Professor Patrick Vallance's career spans industry and academia. In each, substantial intellectual and financial resources are committed to drug safety.

The impact of research



Professor Martin Roland
CBE, FMedSci
is Director of the National
Primary Care Research
and Development Centre
and Professor of General
Practice at the University of
Manchester.

Martin Roland argues we need to demonstrate just how medical science makes a measurable difference to the economy and society.

How do we measure the impact of medical research on the economy and society? For a profession totally dependent on accurate measurement at the micro-level, we are surprisingly poor at calibrating our broader contribution.

Government figures testify to both the excellence and efficiency of UK medical research. Indeed, medical research is increasingly seen as playing a key role in improving the nation's health and wealth. However, alongside recent increases in research funding, there is a growing need to demonstrate the wide range of socio-economic benefits that result from this investment.

Despite significant activity in quantifying the inputs and outputs of research, there are few examples where the broader outcomes and impact of research have been assessed, particularly in terms of the socio-economic benefits. The UK Evaluation Forum was set up by the Academy of Medical Sciences to address this.

The Forum included representatives from a range of UK funding organisations, including the public, charitable, academic and commercial sectors. It explored how different organisations assess the outputs and outcomes of their investment in research, share good practice and knowledge about research evaluation methods, and identified opportunities for coordinating UK activity in the area.

The Forum concluded that there was no one 'best' method of evaluating research. Rather, various evaluation methods are complementary and different organisations and their stakeholders need different evaluation methods at different times. Similarly, research funders need to adopt evaluation methods that are appropriate for their research; these need to take account of the often long, risky and incremental nature of medical research, and to recognise the value of negative findings in adding to overall knowledge.

Some economic approaches to quantifying the benefits of research produce startling results. For example, the American 'Exceptional Returns' study (Funding First 2000) suggested that there has been a 20:1 return on investment in cardiovascular disease research between 1972 and 1992, with an overall benefit to the US economy from cardiovascular disease research of \$1.5 trillion per year.

The Forum identified a need for further work on the economic benefits of medical research, including some areas for methodological improvements. Overall, the Forum concluded that there were clear opportunities for the UK research community to develop better evaluation methods, to encourage better consistency in evaluation practices and to demonstrate research achievements more actively.

A key question addressed by the Forum was the role of the scientific community in promoting research. Some argue that researchers need to be much more up front in promoting their work. Scientists are regarded as doing a particularly poor job in promoting what they do, in stark contrast to those from many other areas of the economy. This made uncomfortable reading for some, who felt that the job of scientists was to advance knowledge, not to be lobbyists.

The Evaluation Forum concluded with four main recommendations

- The research community should consider how it can better demonstrate the value and benefits of medical research to all its stakeholders, through improved use of existing evaluation tools, greater sharing of good practice and the development of new approaches.
- UK research funders should work together to develop an evidence base to demonstrate the impact of research. This should include identifying opportunities for greater consistency of data collection and analysis across funding agencies.
- Research funders should identify and fund further research into evaluation methods with a rigour and quality equivalent to other research fields. In particular, UK research funders should support research to assess the economic impact of UK medical research, which should include a critical analysis of existing economic approaches.
- The research community should consider how it can stimulate a more active and informed dialogue with policy makers and the public about the achievements, applications and broader societal implications of medical research. Researchers urgently need to become more active in this debate.



GP's work at the forefront of communicating the impacts of research in their daily dealings with patients.

Creating the next generation of medical scientists



Professor Keith Gull
CBE FRS FMedSci

is Wellcome Trust Principal Research Fellow and Professor of Molecular Microbiology at the University of Oxford. The Academy's website dedicated to providing information about academic careers can be visited at www.academicmedicine.ac.uk

Keith Gull shows how the Academy is helping to develop the career structures that will maintain and support world class researchers.

The Academy retains two standing committees in careers: one on clinical careers is led by John Tooke, Dean of the Peninsula Medical School; and another seeking ways to influence and improve non-clinical career structures that I chair. As a matter of policy, both groups also include young scientists and representatives of partner organisations and industry. Both teams have had excellent support from the broader Academy Fellowship and, crucially, each is making a significant difference.

In the clinical area the study led by John Saville in 2000 set out how the UK could create a new cadre of clinical academics and ensure the training of individual clinicians in their particular specialism as they undertake post-doctoral research. In the wake of the Savill Report, further studies such as *Strengthening Clinical Research* (October 2003), and the report of the Academic Careers Sub-Committee of Modernising Medical Careers and the UKCRC (March 2005) have addressed the needs of aspiring clinical academics at differing career stages.

The Academy's 2004 review highlighted the success of our Clinician Scientist Fellowships. Alongside this, our Mentoring Programme is now setting a gold standard in the career development of clinician scientists. There are now around 100 partnerships in place with Academy Fellows mentoring those involved in five year clinician scientist fellowships. An independent review conducted in July 2006 by The National Coordinating Centre for Research Capacity Development gave the programme top marks for quality and relevance.

The Academy's work is also having significant influence in shaping career structures for those embarking on careers in the non-clinical area. The Academy's study of non-clinical biomedical fellowships, *Freedom to Succeed*, published in 2005 has had considerable influence in developing good practice. An increasing number of organisations now enter into contractual arrangements with researchers at the conclusion of their fellowship programmes and we will continue to press for the spread of this good practice. Many of the issues and proposals of this report are now reflected in the

structures of existing and new fellowship programmes being developed by the MRC, Cancer Research UK, the Wellcome Trust and other agencies.

There is often still a lack of connectivity between research fellows and industry. It is vital that young scientists have an informed view of the careers that exist in big pharma and smaller biotech companies and the benefits of collaboration between the academic and industrial sectors. Assisting individual scientists to reach their potential and enjoy fulfilling careers has to be central to the Academy's aims. Achieving this will contribute to the Chancellor's exciting ten year vision for science and buttress the retention of UK industry's competitive edge and prosperity.

Another goal, at a time when women form the majority of those embarking on research careers, will be to develop the policies and flexible career structures that are right for women in science.

Most organisations are still not good enough at tracking the career progression of those whom they fund. Too often, we simply don't know if particular training and development systems are working effectively – or even how we go about measuring success. Moreover, in an area where career progression is (rightly) highly competitive, I worry that we still do not really understand the shape of the career pyramid. Put simply, how many medical and biomedical scientists do we need to enter the bottom of the pyramid in order to achieve excellence in sufficient numbers and in the right specialisms as people approach the top?

Of course, not everyone will reach the top of the academic pyramid, and some will choose not to continue research. In these cases it is important that we ensure that their entry into careers in management, teaching, administration, government agencies, finance (and even politics!) occurs as a positive exit from academic research.

The UK will not retain its world class position in medical science unless we create the sustainable career structures that attract and retain scientists of the very highest calibre. The Academy of Medical Sciences is playing a central role in building this pipeline of excellence, at a national and a local level.



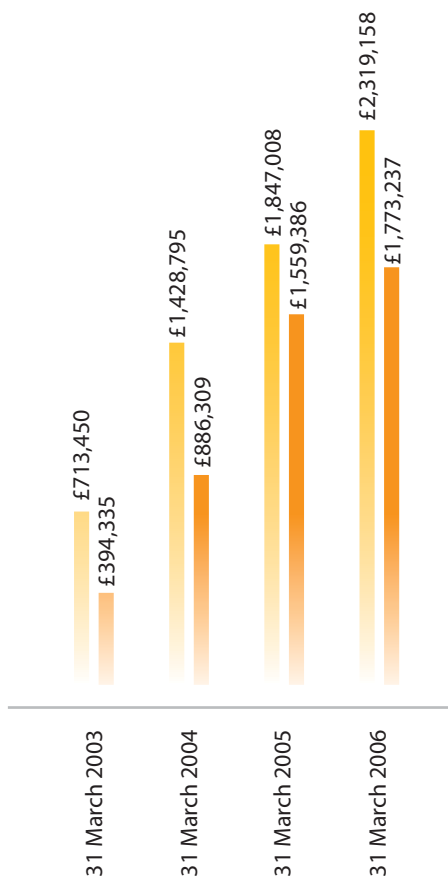
Dr Alison Simmons, Weatherall Institute of Molecular Medicine, Oxford and Professor Brigitte Askonas FRS FMedSci, Visiting Professor of Biology, Imperial College London, one of around 100 mentor pairs set up by the Academy.

Financial information

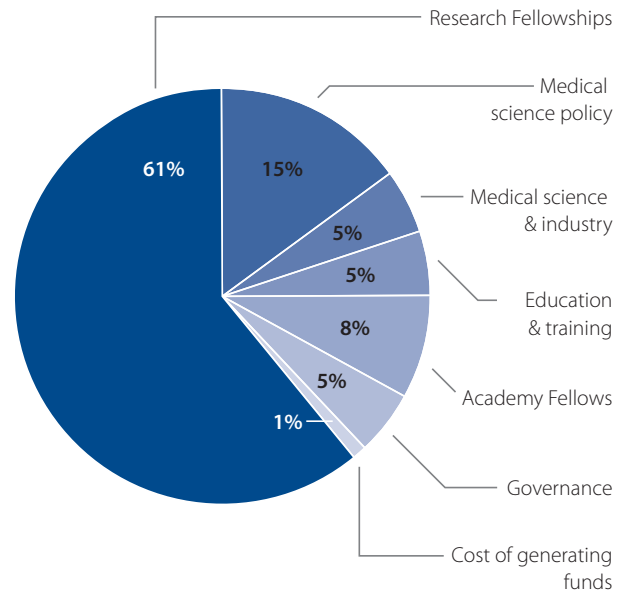
In the summer of 2004 Lord Warner announced that the Department of Health would provide grant-in-aid of £1.75 million to meet the core running costs of the Academy over the next five years. This grant, allied to the support of our Fellows and the other very generous donations we continue to receive, has enabled us to plan for the future and increase activities as demonstrated here.

Income and expenditure over 4 years

■ Total Income ■ Total Expenditure



Expenditure analysis 2005/06



Statement of reserves

At 31 March 2006 total reserves were £2.11 million with £429,000 in the General Fund; £625,000 in the Relocation Fund; £856,000 in various restricted funds and £200,000 as permanent endowment.

The reserves policy, approved by Council in 2006, requires that an amount representing 6 month's expenditure on core activities be retained in the General Fund. Any excess of the target level is transferred to a designated Relocation Fund, set up in response to continuing pressure on office space at 10 Carlton House Terrace. Other balances held in the restricted and permanent endowment funds are not for the general purposes of the Academy but are held on the specific direction of the donors.

To view detailed audited accounts visit www.acmedsci.ac.uk



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