

# the Australian Society for Medical Research



## **Launch of ASMR Medical Research Week<sup>R</sup> National Press Club, Canberra, ACT**

**Address by**

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Many of us believe we are experiencing a profound, world-wide change which amounts to a third industrial revolution. We are now in an industrial situation in which wealth creation and competitive advantage is increasingly becoming underpinned by creativity and knowledge rather than by the ability to organise labour, capital and resources, to make and run things efficiently and cost effectively. Even here in Australia, the contribution of rural and resource exports to the economy has fallen from 77% - 58% over the past 20 years, and the contribution of high tech industries, now > 30% +, is growing at more than 18% per year.

In this context, there are two major themes that all Governments currently believe underlie the future success and competitiveness of their economy: the wish to harness the power and pace of scientific advances to achieve economic success coupled with the need to educate the population so that each person is able to fully participate in and contribute to society. Thus, in this talk I will outline, compare and contrast how I understand the Governments of UK and Australia are addressing this issue with particular reference to medical research, acknowledged as a long-standing strength in both countries. What pointers can the UK experience give to you to help persuade your Government that it needs to think rather differently about research and education if Australia is indeed to be the “can do country” envisaged by P M Howard, a country that is a leader in the production and exploitation of ideas for wealth creation and to improve the quality of life.

Let me begin with the Universities: the health of which is crucial to this endeavour. Universities are one of the most enduring of human institutions, tracing their roots back almost a millennium. It is hard to believe as we begin the 21st century that when I began my academic career in 1956 as an undergraduate, less than 10% of the population went on to tertiary education, and for the first couple of decades of my involvement in scientific research, no one gave a thought to the notion that one’s ideas might be patented and that scientists might make money from their activities. We did research for the public good. But the increasing cost and eventually power of the biological and IT revolutions have totally changed our perception. Moreover, the realisation that businesses based on

knowledge, creativity and services are gradually taking over as the engines of economic growth has led our Governments to require universities to educate a much higher proportion of the population to tertiary level - 50% is the current UK goal - with an ever decreasing unit of resource per student trained. In the context of the new, knowledge based economies, over the past 2 decades the UK and Australian Government administrations have neglected the funding of their science base to an astonishing and serious degree compared with competitor nations, and at the same time, whilst allowing their pay and conditions to deteriorate sharply compared with other professions, put enormous pressure on the staff of universities to increase their productivity, in terms of students trained and research produced, a pressure that continues relentlessly. In the UK, resources for the teaching function of university have fallen by 40% over the past 2 decades and are still declining by 1% p.a. In the research intensive universities, these funds are only 30% of their total income, but this pays for staff salaries, student facilities and basic infrastructure. Two recent comments from senior UK Government figures seem to sum up the position for both the UK and the Australian university scenes. It is unfortunately true as the UK Secretary of State for Education, David Blunkett, said recently "higher education has been addressed only episodically, and without sustained interest, for much of our recent political history". And the most recent evidence is that the UK Government doesn't believe there is a funding crisis in the Universities - the Permanent Secretary at the Department for Education and Employment recently said that Universities are well funded, lecturers are well paid and that any problems are of the institutions own making. He referred to issues of leadership and management and the effectiveness of decision making processes. Those of us who think otherwise believe he desingenuously conflated the public and private revenues of Universities and disavowed the huge effort required of staff to produce the success Universities have had in raising private money

### The Funding of Research

In both the UK and Australia, funds for research in the science base have not increased for many years, at a time when competitor countries have been increasing their investment in R & D. Moreover, statistics show that industrial investment in Australia in R & D has fallen progressively for the last 3 years. Thus Australian R & D investment is below the level occurring in competitor countries, so where your universities will get their research funds especially when in competition with the full time scientists in CSIRO isn't clear to me. Thus, Australia seems to be in the paradoxical position of its investment in R&D by Government and business being reduced as we enter the knowledge age to an extent that has not occurred in competitor countries, and the underfunding and stress on your universities mirrors the UK position, although the details of the situation may vary.

The Wills Report concerning Medical Research seems to be a glimmer of light in an otherwise gloomy scene, but even if fully implemented, it will only succeed in bringing Australia to the bottom rank of European countries in terms of funding for medical research and nowhere near USA or now Canada.

And what about the funding of key basic sciences such as physics, chemistry and mathematics in Australia? Advances in medical research have always depended on input from people with these backgrounds and never more than today. I understand the ARC is being revamped and there is an ongoing enquiry into science. There is talk I hear that at least one leading Australian university may close its science faculty. All the gloomy statistics suggest that science in Australia has been pretty much neglected for the last decade and more. When the Wills Report is

implemented, Australia would be wise to make renewed efforts to ensure the health of these subjects at all levels of education as well as in the national research effort.

Let me illustrate what has happened to the funding of medical research in the UK in the hope that this example may help you to move things on here. The UK medical research effort has remained more competitive than it might because of the huge input from the medical research charities, in particular the Wellcome Trust but also the major cancer charities, ICRF, CRC whose activities I greatly admire. The Wellcome Trust has put in more than £250m p.a. for the past decade, and in the current year, it will commit £600m to medical research largely in the UK.

This input has more than doubled the funds available to UK medical research scientists but I like to think we have been able to use this financial muscle to set examples and, importantly, to lever funds from Government. Let me illustrate by explaining how we used our funds at the Wellcome Trust as we became increasingly wealthy during the years since 1986 with particular reference to our success or failure in leveraging a response from Government by taking certain actions.

My prime concern as Director of the Trust during its period of greatest growth was to focus on developing career structures for the scientists funded by the Trust and by the time I stepped down in June 1998, we had fully developed schemes for the training and support of basic scientists, medics and vets from PhD to professorial level through iterative discussion with the relevant communities. Australia does benefit to a small extent from this commitment to career development through the Wellcome Trust's 5 year Australian Senior Fellowships.

I also tried to ensure that the Trust fully funded grant requests i.e. did not salami slice its grants, to progressively increase the proportion of 5 year grants, to strengthen the infrastructure of research laboratories, and to build on existing UK strengths in molecular biology, genetics, and neuroscience. The largest investment made by the Trust during my time as its Director, was the creation of the Wellcome Genome Centre at Hinxton near Cambridge, where the Sanger Centre has had a lead role in the world-wide effort to sequence the human genome and the genomes of model and pathogenic organisms over the past 5 years.

Because the Trust's growth continued over a decade and a half and was so enormous, we could do this without neglecting fields of long standing interest to the Trust such as infectious diseases, including diseases of importance in tropical regions, epidemiology and the training of clinically qualified people in research etc. I was aware that real advances in biology have always depended on inputs from scientists trained in the fundamental disciplines of physics, chemistry and maths. But as the Trust's remit is to fund medical research, we could only help these disciplines peripherally. Thus, we could and did contribute substantially to the national infrastructure of biomedical science increasingly from 1986 onwards, but I was uncomfortably aware that the infrastructure for chemistry and physics was falling behind by Government neglect. With the arrival of the Labour Government in 1997, my last important act at the Trust's Director was to persuade the Trust's Governors to put up £400m and use it as a lever to get a comparable sum from Government which could provide funds to begin to address the decrepit infrastructure of those sectors of the science base in universities that the Trust could not support directly. Thus, in 1998 an extra £1.20m was committed to the UK science base, but since then the funds for strategic research provided by UK Government departments such as agriculture, trade and health have been cut. This illustrates only too well why Prime Minister Blair talks about the need for "joined up" Government!

What has the Wellcome Trust done about the key issue - at least to me - of academic salaries? Starting with PhDs in » 1986, the Trust unilaterally increased the stipend of its scholars and fellows and last year, the Trust introduced a very large hike - 30% - in the salaries it pays its career award holders. Unfortunately, though this action has probably helped the Medical Research Council to raise the salaries it pays its PhD students and staff, it has not helped the situation in universities where starting salaries for university lecturers are now less than graduates entering school teaching or constables joining the Met in London. In consequence there is a widely perceived flight of the nation's most able young people from careers in SET in favour of such professions as law, medicine, finance, accountancy and the media. Furthermore, the able young attracted to a research career eschew employment as University academics in favour of full-time research posts if possible. This can not be good for Universities. Because most academics are trapped by choices made early in their careers, it takes a long time for changes in relative pay to affect quality. In the UK, the time of reckoning is now with us. Almost 30% of academics are 50+, and in biology, physics and mathematics the ratio is 36%. Recruitment of new staff is proving difficult in many key areas: many chairs are empty in medical schools, and subjects such as engineering and computing can't find staff because pay is too low.

There is undoubtedly a stand off between Universities and Government over the funding of higher education in both Australia and the UK. Unless this is resolved soon, I believe the international competitiveness of our premier universities will slide progressively rapidly.

The strength of our Universities is, of course, very dependent on the quality of our schools. One of the strengths of the current UK Government is the serious efforts it is making to improve the quality of the performance of our schools. Again, changes here are putting huge pressure on the staff, and recruitment of science teachers is falling, though the UK Government does accept this is a serious problem and has put in financial incentives to address the situation.

#### The Science Base and its importance for Industrial Success

Like most of you, I do not think you can have knowledge based industries unless they can draw on a strong science and technology base, and unless there is funding to lubricate technology transfer and a fiscal regime that encourages the establishment of start up companies and nurtures their development into SMES and eventually, major businesses. That is to say, I entirely support the policy of both our Governments, which is to couple the nation's science base to wealth creation and the improvement of the quality of life or , to say the same thing in another way, the Wills notion of the virtuous cycle, a mutually reinforcing partnership between the research community, industry and government. Recently too both the present UK and the current Australian Government have begun to realise that it can't leave all funding and activity to the private sector.

In the UK, we have come increasingly to realise that the process of technology transfer and business development can not come about simply by exhortation. A much more sophisticated approach is required, involving the active participation of Government in a number of ways. The innovation process by which new scientific and technical knowledge is exploited by business is highly non linear, and varies considerably between industrial sectors. Whereas I am told that in the computer, electronics and telecommunications sectors, enabling technologies and applied research are normally more critical for companies than basic research, there is no doubt that in developing biotech and pharmaceutical companies, basic, leading edge research is crucial.

Key requirements are appropriately trained people, availability of finance, provision of fiscal incentives, and modern and effective sponsorship from Government departments. Once those working in the science base began seriously to try to develop their ideas and discoveries for wealth creation, it became clear that the UK universities lacked funds to capitalise on ideas especially at the earliest “proof of principle” phase in the process, when novel ideas need development to decide whether or not they have market potential. This led to the setting up of the UK University Challenge Fund, a total of £40m to be won in competition provided jointly by the Government (Department for Trade and Industry), the Wellcome Trust/the Gatsby Foundation. This has provided a number of university technical transfer units with seed corn money for this purpose. Subsequently a new venture capital fund has been set up of funds for investment in UK based early stage technology companies, funded by public/private funds. Moreover in its most recent Budget, March 2000, the UK Government has instigated a number of fiscal changes to increase incentives for individuals and with changes in business taxation, share options etc.

A recent report from the UK CST which advises the Prime Minister “Technology Matters” emphasised the importance of partnership between business and the science base and suggests ways in which the Government might foster this interaction. They include policies aimed at achieving a larger cadre of people highly skilled both in technology and in running a business, and increasing the two way flow between companies and universities of senior people. Funding arrangements for universities should be such as to enable them to respond dynamically to the huge challenges and opportunities ahead, including the ability to compete in the global market for world class teachers and researchers, an issue to which I shall return.

Following the reports of Wills and Ralph, your Government too seems to have accepted that it needs to take action and make fiscal and taxation changes to help the process of technology transfer into the industrial and business community.

And, at last, increased funds are being made available for medical research, thanks to Michael Wooldridge, together with other incentives to increase the funding pot and improve its management by reforming the National Health and Medical Research Council.

But even if fully implemented, these changes will only bring Australia to the bottom rank of competitor countries - and only, I understand, concerning funds for medical research in the Australian academic base.

### The Interaction between Science and Society

The rapid pace and increasing power of science has had the unforeseen consequence that we are seeing a huge increase in public unease about what science is now able to do. In the UK the BSE tragedy provided the climate for the unprecedented explosion of anger against GM foods with which we are still learning to live and which has found its way out here.

As the power and speed of science has increased, it is probably inevitable that people get taken by surprise as powerful new methodologies have given scientists ways and means to change living creatures that were previously unimaginable, and in the opinion of many people, we must realise, unnecessary and wrong. Two reports were published recently which I believe are a real landmark for the future development of this subject in the UK.



The House of Lords report emphasises the point that if the scientific community wishes to retain its “licence to practice” then it has to change the way it operates within society. The House of Lords report has 5 main points which I suspect would resonate here in Australia as well as in the UK.

- There is a crisis of trust and confidence.
- Public attitudes and values must be heeded.
- New culture of dialogue between scientists and the public.
- Prescription of openness and transparency.
- Learning to live with a free press.

The OST/WT report on public attitudes was reassuring but also warns us that we must be more up front about what we are doing and how we are regulated.

- Public does appreciate and support science and appreciates its key role in the economy and in advancing medicine.
- People readily accept advances if there is clear benefit, even if there may be risks. (Mobile phones vs GM foods).

BUT

- People feel scientists seem to be trying new things without stopping to think about the risks.
- People are concerned about society’s ability to control science. A strong lead from government is essential.

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In summary, we scientists have to change our ways in communicating about what we do. We must understand that retaining “our licence to practice” science depends on our ability to take the public with us, and our willingness to listen to their views and accept that some things that are scientifically possible may be unacceptable to our fellow citizens, at least temporarily if not finally. That is, we scientists use public funds for our work, and thus we must constantly bear in mind that we serve our fellow citizens and need to take on board their attitudes and values.

Finale

I referred at the beginning of this talk to the notion that the world is in the midst of a 3rd industrial revolution where wealth creation and competitive advantage depend on our ability to spot creativity, develop it and put it to our advantage. I am told that the countries that are best succeeding with this new agenda are the US, Ireland and Israel.

It seems to me that Australia and the UK are moving more or less in parallel. We have neglected the funding of our science base for a couple of decades and only in the last 2 years begun to redress the situation. However, even now funding is patchy and at a level that does not match the international competition. As I have already said, our universities are struggling to educate more and more with ever diminishing resources, and it seems, with Governments that don’t believe the universities are in real financial difficulties.

In Australia and UK, governments are vigorously addressing impediments to technology transfer from science base @ industry and have increased funds for medical research.

- Questions remain:
  - Are we producing enough people of the right quality and with appropriate training in science and technology?
  - And are poor career structures and low levels of pay resulting in a decline in the quality of recruits to academia and the science and engineering base?

Both our Governments are seriously attempting to provide fiscal and tax structures to help new and existing businesses to take advantage of new technology. But in both our countries, the key issue of recognising and supporting talent with proper career structures and pay are off the national agenda. In an era where creativity is the driving force, this has to be an absurd situation. Neither Australia nor the UK can afford to neglect such a high proportion of its most talented people. To me, the key manifestation of Australia's arrival in the new age of industry will be that it has become an attractive place for the most creative people. Nowhere is this more exemplified than in Ireland where for the first time in its history brain gain is exceeding brain drain.

What more can the scientific community and Government do to drive the agenda forward? ASMR has a long record of working with government and I'm sure will continue to do so. On the evidence of my discussions as I have travelled around Australia, it is well on the way to participating in the industrial part of Will's Virtuous Cycle. But there are other matters scientists need to concern themselves with.

What should scientists do to move things forward?

- Must face up to differential pay and the introduction of contracts that ensure continual performance. Career uncertainty is universal.
- People with real experience of technology and business are crucially important.
- Scientists "licence to practice" depends on a two way dialogue with society.
- When making decisions about funding, make longer and better funded grants.
- Colleagues who excel at technology transfer and dialogue with the public need parity of recognition and esteem by academic colleagues.
- Academic community needs to develop data on brain gain/drain related to quality.
- Fund-raising from benefactors, especially alumni, of universities needs to become a core activity.

More too is expected of Government.

What should Government do to move things forward?

- Outstanding scientific expertise is rare and such individuals are in world-wide demand - this reality should be reflected in employment terms.
- A strong science base requires government funding: strategic and applied work can not flourish without this investment.
- Government needs to ensure fiscal, taxation, capital gains taxes, share option schemes, etc. are internationally competitive to allow new businesses to attract venture capital and investment to establish and mature.
- Be more realistic about the actual cost in terms of staff time that government initiatives impose on academics.
- Ensure government departments work together to achieve technology transfer and help early stage manufacturing.
- Think long term (10 years) and put national interest before Party interests.

And finally

- Why does Australia invest so heavily in sport with such spectacular results but often seems to fail to appreciate that an equal obsession with academic excellence and business innovation would pay dividends for the economy?
- Australians spend much of their discretionary income on sporting activities. Government needs to ensure they have income to spend! Proper funding of the science base is crucial to ensure Australians remain prosperous.

Sport is not the only national asset that requires real commitment for the future

economic health of Australia.

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