



*A conversation with Kevin Moses,
Director of Science Funding at the Wellcome Trust*

Photos (3): Wellcome Trust

“There is No Permanent Tenure in Science Funding”

Research funding is a finite and precious resource, so decisions about who or what should be financially supported must be made wisely. The Wellcome Trust is trying their best with an improved review system.

Lab Times: In 2010, the Wellcome Trust announced a radical shift in research funding when it created the Investigator Awards. The Lancet reported ‘Wellcome Trust to fund people, not projects’ (2010, 375:185). Nature Cell Biology described it as ‘Funding elite science’ (2010, 12:917). Much of the inspiration for these awards appears to have come from the Howard Hughes Investigator programme (HHMI fund 330 investigators with \$1 million a year for five years). Are there any significant differences between these awards and their programme?

Kevin Moses: The answer is yes and no. The philosophy of funding in a meritocratically elitist manner is similar in that both organisations are interested in funding the very best people. But in terms of mechanism, it is less accurate. The pre-existing Wellcome schemes, called Fellowships, are much more similar to HHMI Investigator Awards, because a Hughes Investigator’s salary is taken over by HHMI.

The new Investigator Awards are intended to fund people with university posts. Really, the only difference between the Investigator Award and Senior or Principal fellows is that the Investigator’s salary is supported by their home institution and not by their Wellcome award. The

reason we call them two different things is historical. If we had a blank slate, I would not have two names, fellowships and investigators.

Otherwise, the schemes are coming very much into alignment. They now share the same deadlines and the same committees for proposal review and for interview. Candidates for both awards come through on the same day and see the same committee. I very much want everything on the same standard.

If you look at the demographics, it’s actually fairly flat across the age bands of the career structure. There are fewer New than Senior Investigators, in part because you can only be a new investigator once, so there is just a five-year window when people can be “new” and then there are several five-year intervals, during which they can be “senior.”

There has been concern that Wellcome’s decision to ‘fund people, not projects’ represents an unbalancing shift in the UK’s research ecosystem at a time of severe budgetary constraint. The UK government has reduced its overall funding while the Wellcome Trust appears to have effective-

ly chosen to fund fewer ‘elite’ researchers with larger sums, where before it offered less money to more people (‘spread it around more evenly’). Do you accept that some groups have been excluded by this change? For example, with the Investigator Awards in 2011, 750 pre-submissions resulted in 173 written ap-

plications, of which just 55 were selected for interviews where applicants had 10 minutes and just 3 slides to explain their request. This led to 25 awards for a total

of £57 million covering a period of up to seven years. However, 15 of these awards went to just four universities. By comparison, in 2009, the last year of the project grants, 58 UK institutions received funding and there were many more project grants.

Kevin Moses: Our overall response mode budget has changed very little but I estimate that by the time the last programme and project grants are done in two or three years, the number of independent scientists whom we fund through Investigator Awards will be roughly three fold less. We want to put the resources into the most productive labs by means of an improved system of review that now includes an interview. Our mission is not to fund research in all universities in the UK, it is rather to get the best science done with the money that we have.

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What about the middle? I think about the middle in two different ways. One is the chronological middle of a researcher's career. The Trust runs an extensive set of fellowships that cover the career structure, both for basic scientists and for clinician-scientists. Another way of defining the middle is in terms of scientific quality. We have no commitment to fund middling science. I would ask: are those the best places to train our graduate students and post-doctoral fellows? In this sense, I am shamelessly meritocratic. Our funds are precious and we must always work to spend them on the best science.

How do you explain the philosophy behind these awards?

Kevin Moses: I realise that the term "elitism" carries baggage. I think there is "good" elitism, which I define as meritocratic. Then there's "bad" elitism, where people

inherit privilege, by some feudal system or club or old boy network. No reasonable person is in favour of "bad" elitism. So I prefer to use the word "meritocracy".

In principle, if you had a perfect system of peer review and ranking, there might be some perfect ranking of researchers. At

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the logical extreme, one might then give all the resources to the very top person. They would have billions to spend and they'd have an enormous laboratory, turning them into a CEO (chief executive officer) at an industrial scale. Few, if any, scientists have been selected or trained for those management skills. Similarly, one would have only a single person fully empowered to have original ideas: not a good use of all those other brains! At the other extreme, one could give a little bit of money to everybody. I don't think that would prove to be very produc-

tive either. I am most definitely in favour of early scientific independence: I want to get as many of our scientific brains thinking for themselves as early as possible.

At the same time, I do think that we need a strong element of competition and re-validation. There should not be permanent "tenure" of grant funding. In fact, I don't think tenure is that significant for productive people. I gave it up twice myself. Grants from the NIH, the MRC or the Wellcome Trust are for fixed terms. In the USA, where it is still common, academic tenure may protect peoples' pay check, office and letterhead but it does not protect their research funding or lab space. The amount of money that society has for funding research is finite and precious and there are a lot of things waiting to be discovered. The Wellcome Trust aims to fund the best science, which may not be the same thing as providing secure employment for scientists.

Do you think the Wellcome Trust has a larger role in the total research environment?

Do you accept that its shift in research funding may have had negative effects on public research in the UK?

Kevin Moses: I have a bias towards a wide funnel for training: graduate studentships and postdoctoral fellowships. We need to give many people the opportunity. So we invest in a lot of people at the early career stages and let them have their go to compete. Then I would want to offer more of them a chance at running their own independent research group. But I argue that the system must remain competitive and meritocratic at each level.

What do you feel is the right balance in funding between 'elite' individuals and their high profile projects and of less prominent and fashionable researchers, places and subject areas?

Kevin Moses: Fashionable areas: that's an interesting question. And more difficult. So I'd like to answer this one as a parable. If you imagine, 250 years ago there was an active field of human gross anatomy. People were looking at the bones. If you had called a committee of human anatomists

and asked them to select the best proposal and interview the candidates, they would never have stopped. The human anatomists would always say that their field needs more money. There are always more skeletal scratches and bumps that need names.

Somehow, science and science funding must move on. Part of our job is to always be looking at what is strategically worth doing. And the Trust makes real judgments about where opportunities lie. In any one year, our budget is set and we have to allocate it between different fields, activities and funding schemes. If we are going to do more of something, or something new, we will have to do less of something else. The Trust must always be thinking hard about what's important.

What kind of feedback have you heard from researchers?

Kevin Moses: I've been in the job a year-and-a-half. So far, I have gotten to see roughly two-thirds of the people that we fund as Investigators and Senior or Principal Fellows. I have been to our UK Centres and our major

overseas programmes, and I'm still working through the strategic awards. Yes, I have been selectively sampling the people who like us: we are funding them! But, I also meet other people in other places, many of whom given me a less polite view.

We fund roughly 25% of our grant applications. This is a lot more than I'm used to from the U.S. where you can have a much lower chance of getting an NIH R01 grant (often less than 10%). Nonetheless, if we fund 25%, the other 75% may be unhappy at any one moment.

I will also admit that no system of peer review is perfect. We do the best that we can. We use review committees made up of the best and most expert people we can find. They give us their time, which is also a finite and precious resource. We work on being as efficient as we can with the available sum hours of high-level reviewer and interviewer time.

However, nothing is perfect; people have good days and bad days. Many, very high-level people get our Investigator Awards. We publish the names of those who get the award on our web site but

we do not publish the names of those who fail. In fact, some senior people do fail. We do discover some of their problems at the interview and so I am convinced that the addition of this step has been helpful.

Filling out grant applications has become a time-consuming bureaucratic process for researchers. I understand you've streamlined and simplified the process for Investigator Awards to reduce the time and effort for both applicants and reviewers. How does this work? Is the final selection really based on a ten minute oral presentation with just three slides? It must be quite a nerve-wracking experience to know that such large grants depend on this oral performance?

Kevin Moses: People do give a short talk, and then there is more time for questions from the committee (the timings are not exactly the same for all schemes). Yes, it is more rigorous but I argue that this rigour is a good thing.

In terms of paperwork, is it a lot easier?

Kevin Moses: There is now a 3,000 word vision statement and project description. This is intended to reduce the emphasis on technical detail, especially for more senior people. We aim to emphasise the person rather than the technical specifics of the project. There are also other elements in the

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...did his PhD with Michael Ashburner at the University of Cambridge, where he studied gene expression in fruit flies. In 1986, he was a postdoc in Gerry Rubin's lab at UC Berkeley. He continued to research the developmental molecular genetics of morphology, cell-type and pattern using the fly eye in his own labs at USC in Los Angeles, then at Emory University in Atlanta, where he also used flies as a model for the Fragile X syndrome of mental retardation. In 2003/4, he was invited by Gerry Rubin, founding director of the then yet-to-be-built Janelia Farm Campus near Washington, to join the project for this first research centre of the Howard Hughes Medical Institute (HHMI) – "a science utopia" dedicated to understanding the workings of the mind. In 2005, Kevin left academia to work at Janelia Farm, ending up as the Chief Academic Officer (of that non-Academic Institution). In 2011, he returned to the UK as the Wellcome Trust's Director of Science Funding.

proposal: a CV and a few other parts. For Senior Investigators, the maximum funding period is seven years. While I can see that the process may be stressful for some, I consider the effort required very reason-

able in proportion to the size and duration of the award.

Some people have failed but succeeded the second time through. I have seen cases, in which people saved their application

at the interview by successfully addressing doubts in the committee in person. This could not have happened in the previous schemes that had no interview. The interview is another chance and another way to make the right decision.

In 2012, there were 45 Senior Investigator and 10 New Investigator Awards. However, even 'New' investigators must already have an established job in a university or research institute. What do you think about the job situation for postdocs who are still trying to get established?

Kevin Moses: I think a lot about the pipeline that produces our excellent scientists. We would fund more excellent people, if we could find them. Recently, I went to the Henry Dale Fellowship interviews (for researchers less than seven years after their PhD) and we did fund all the people who met the standard: we were not limited by the budget. The UK does fund a large number of PhD students each year, roughly two orders of magnitude more than the Wellcome Trust. While it is a good thing for PhD-trained scientists to do many other things in life, this ratio does seem excessive.

You're funding good people and they have their labs. But the people who are working for them are not necessarily as exceptional. What happens to them after a certain period if there are not the finances?

Kevin Moses: This was something I discovered myself as an assistant professor in the States. It is almost inevitable when you start your own lab. People have gone through a lot of intense competition to get to that point, so the chances of getting someone as good as themselves are low at the beginning. For quite some time, they are their own best asset. Having the management and leadership skills to get outstanding work from less than outstanding people is a key part of the job. It's difficult and newly independent researchers have not been trained or selected for it. Sadly, many excellent new PIs fail at it. The Trust is actively considering new supplemental resources to offer our mid-career scientists, to help them through this transition. Watch this space!

I also think that we would benefit from better career paths for people who may be excellent at the research but are just not cut out for the demands and stress of management responsibilities or scientific independence. Or maybe people who are going to work on their own but just not be managers. We do need to be able to give people small grants. In fact, the Trust does some-

The Wellcome Trust – Facts & Figures



In 2004, the Queen inaugurated the Wellcome Trust's new administrative headquarters, the Gibbs Building, in London. Over 28,000 m², 600 staff work together "in an inspiring, comfortable and dynamic workspace", according to the architects.

The Wellcome Trust was established in 1936 to administer the legacy of Sir Henry Wellcome, the Anglo-American pharmaceutical magnate, which included the entire share capital in his successful drug company, Burroughs Wellcome. The Wellcome Trust is an independent charity funding research to improve human and animal health. Since the 1980s, the Trust has diversified its investments. In 1995, it sold its remaining pharmaceutical stock to Glaxo, creating GlaxoWellcome (now part of GlaxoSmithKline).

The Wellcome Trust is the most generous charity in the UK. Together with the Howard Hughes Medical Institute (HHMI) and the Bill and Melinda Gates Foundation, it is one of the world's largest research charities. In 2012, the net asset value of the Wellcome Trust was £13.3 (ca. €16) billion. Charitable funding benefited from £746 million of its revenue. Science funding accounted for £435.7 million. In addition, the Wellcome Trust Genome Campus received £117.5 million in direct funding. This site includes the Wellcome Trust Sanger Institute (that contributed to the human genome project), which has received more than £1 billion over the last 18 years.

The Trust's funding focuses on: supporting outstanding researchers, accelerating the application of research, exploring medicine in historical and cultural contexts. It supports research into all aspects of biomedical science, "From molecules and cells vital to life, through the spread of diseases or the vectors of disease across the globe, to clinical and public health research to improve the quality of healthcare."

Most of the Trust's research spending is in the UK (£372.5 m) but international programmes in 28 countries also received £40.1 m in direct funding. It also supports research in medical humanities and engagement (£63.1 m), and encourages technology transfer (£84.8 m).

The Wellcome Trust is highly influential in UK biomedical research. By comparison, in 2011/12, the government-funded MRC (Medical Research Council) spent £759.4 million on research, with £354.6 million for 440 research programmes in MRC units and institutes, and £309.9 million on 1,100 grants to researchers in universities, medical schools and research institutes. International investments totalled £58 million.

In April 2013, Sir Mark Walport, The Wellcome Trust's director since 2003, will become the Chief Scientific Adviser to the UK Government.

times do just that. I know of one Wellcome Trust Senior Investigator who has only one other person working in the lab.

We also need to find ways to support “senior scientists”: people who spend many years, or maybe their whole career, working in somebody else’s lab. If they’re doing great work and they’re just not motivated, or driven, to jump into the intense competition themselves, we should fund that person, give them a decent salary and a decent career because they are contributing. We need to make sure our award budgets can support them in the labs of our independent scientists.

How does the Wellcome Trust measure the success of its funding policy?

Kevin Moses: A flippant answer is: with great difficulty. There are all sorts of impact metrics. None are perfect, so we try new things and compare them. At the same time, we do our best to leaven our metrics by actually going out and looking. This is something that Mark Walport persuaded me to take more seriously and now I see how right he was. So I, and my senior staff, go out and visit our major award holders.

Maybe somebody is doing something important. They’re on their way to a big paper but it will take a few more years. A famous example is John Sulston, when he was cutting the EM sections of the worm (*C. elegans*). It took him a number of years to get through all that but his director could see that something important was on the way. There are people like that. One has to actually know rather than just use metrics.

An advantage of having a smaller number of major awards is that we can actually have personal experience of them all. All of our researchers now come to the Trust to give a talk every year, and we go and visit them every year. We also do our best to know what else, and who else, is out there.

But in ten years time, if you’re looking back, is there any way of saying: we spent all this money and this is an example of our success?

Kevin Moses: There are a lot of people who say: there’s been ten years of the human genome and what have we got? Actually, I think we are beginning to get things. Cloning developmental mutation genes

from model organisms, sorting out genes associated with human diseases, picking apart what it all means. What they do biochemically. How they sit in different pathways. People now can see that to treat a disease, you may not have to target the particular protein you found by means of genetics. You may realise that something else three steps down the pathway is more drugable. There may even be existing and approved drugs already available and so a new application for them becomes apparent.

This kind of knowledge is taking a long time to go through bit by bit. There are few shortcuts to really understanding mechanism. “Omic” technologies may help but I worry that lengthening our list of trees may not always help us to see the wood. So, I predict that in the next decade or two we’re going to see more and more falling out from the genome project. When people started using personal computers, there were predictions about paperless offices and how people would lose their clerical jobs but it took a long time before they made any real difference; and for the technology and the knowledge base to build up around it.

I have my personal opinions about the things that are going to have long-term, very wide impact. I think understanding the brain is going to be important but perhaps on a longer time-scale.

One thing I haven’t really emphasised enough: there are people who are orders of magnitude more creative or productive than other people, even though on the outside they might look similar. There are people who are more self-driven. I’ll hazard the word “genius”. If you just support these people, they will get on with it: they can’t help themselves. Sadly, for most of us, if you give us the money, we would just go and drink a cup of tea and watch TV (as I am tempted to do right now). That is why there is no permanent tenure in science funding.

These are obvious things. People forget them. While necessary, the insecurity does make the scientific career more stressful than some.

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INTERVIEW: JEREMY GARWOOD

More insights from Kevin Moses at www.labtimes.org.