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# Funding scientific discovery: an interview with Sir Mark Walport

Sir Mark Walport is Director of the Wellcome Trust, one of the world's largest funders of scientific research. Here he talks about the qualities of a successful scientist and how informatics might advance the future of medicine.

Among the largest sources of science funding in the UK is the Wellcome Trust, one of the largest private research funding organizations in the world. It spends around £600 million (approximately US$900 million) yearly supporting the brightest minds in biomedical research and the medical humanities. The Wellcome Trust recently outlined five ambitious challenges including: maximizing the health benefits of genetics and genomics; understanding the brain; combating infectious disease; understanding aging and chronic disease; and connecting environment, nutrition and health.

Sir Mark's influence in the Wellcome Trust goals is evident, and reflects some of his unique experience and perspective. His ability to recognize good science stems from his own experience in medical research. When he was the Head of the Division of Medicine at Imperial College London, his laboratory investigated the immunological and genetic underpinnings of rheumatic diseases. His participation as a Bill and Melinda Gates Foundation board member for Grand Challenges in Global Health indicates his commitment to medical advancements worldwide. He recently discussed some of his thoughts about good science: how to identify it, how to facilitate it, and how it might influence more people's lives.

**If the world of research began anew and its infrastructure could be organized from scratch, what type of funding structure could be used to identify and support good and creative research?**

Research is carried out by researchers. Therefore, the challenge is to identify and fund the most talented researchers, and enable them to tackle questions that they identify as important. These people need to be provided with the resources that they need to do their work, a physical environment that facilitates their work, and the collaborations with colleagues to form teams. So, funding sources need incentive systems that allow scientists to work in whatever configuration optimizes their chances of answering important questions.

At the end of the day, research is about identifying what the key questions are and knowing which of them might be tractable. A defining characteristic of good scientists is that they can recognize tractable questions, and you need to provide such scientists with the time, environment and equipment that they need to get the answers.

**Are private funding sources more apt than public sources to promote creativity and take on high risk?**

Private funding divides into two categories. First, there are private funders with a very defined mission within research. For example, some focus on a particular disease, such as Alzheimer's or diabetes. These, of course, are interested in solving a particular problem and they may have quite an applied focus.

Second, there are private funders that take a broad view of research; the work of the Wellcome Trust would be a good example of these. We can take a long-term view of science and fund important questions that will probably take a long time to solve.

**You mention the environment in enabling a scientist's success. Are there things that you think a research institution can do that promote good science?**

**Wellcome Trust 2010.**

Absolutely. There is an endless debate between whether a university or research institute is a better environment to do research. There really is not a correct answer, since some of their goals are different.

A crucial role of universities is to provide education. Good universities perform high-quality research and also provide high-quality education. They are well-situated to inspire the researchers of the next generation. That is an important and unique responsibility for universities.

However, scientific creativity and productivity can be threatened by the university structure. Universities have individual academic recognition schemes, meaning that they depend very much on how each of their single members performs as an individual. That can be quite damaging to team building and collaboration since scientists must focus on goals that allow them to shine. How credit is given is a difficult issue in the academic environment. There isn't much for an individual to gain from being a member of a team in the academic hierarchy.

Sir Mark Walport was appointed as Director of the Wellcome Trust in 2003. Before joining the trust, he was Head of the Division of Medicine at Imperial College London.
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This problem is recognized in industry, so they often develop incentive structures that can promote useful interactions among scientists.

**The scientific training in universities is very dependent on mentor relationships between the heads of laboratories and graduate students or postdocs, who do much of the bench work in science. I've heard your 'family tree' philosophy: the idea that great scientists are usually trained by other great scientists. What qualities are common in great scientists that promote their ability to be great mentors?**

It is very important to distinguish patronage from mentorship. There are some systems that operate very heavily on patronage, which is a fairly narrow responsibility of 'I'll look after you, young person' and 'Do as I say'. Mentorship is much broader than that and requires selflessness.

I received a very good piece of advice when I started at Hammersmith as a Senior Lecturer, which was the time when I first became a mentor to others. I was told that I should take my best young scientists and give them the best projects that I had to offer. The idea is that, if you look after the careers of the people who work with you, it is good for them, and ultimately it is good for you as well. Future potential members of your laboratory will see that their predecessors have done well when they are deciding if they should join your lab. A scientist's legacy is a combination of his or her discoveries and the people that have been trained. Therefore, mentorship is incredibly important.

Mentorship is about leading young scientists to the issues that really matter and helping them to identify the most important research questions. Then a good mentor should advise them on how to apply the appropriate methods to tackle the problem. Mentorship also means providing good advice for people about how to advance through their careers. If a scientist is going to develop a good independent career, their mentor needs to help them develop their own ecological niche in science. One way that a young scientist can achieve that, is to physically move around and experience research in different laboratories. This allows the developing scientist to add a bit of worldly diversity to their experience and expand the breadth of their knowledge.

Retrospectively, I realize that I was very lucky. I had very good mentors, although they didn't really know that they were mentors as the term has really only begun to be used fairly recently.

**You have spoken out to support the use of medical databases containing scrubbed patient files in medical research. How do you hope to see patient information used?**

Electronic records help physicians to look after people. If an individual becomes ill while traveling away from home, or has a complex medical history, there's a comprehensive medical record that can be summoned up on a screen. This patient information can be readily accessible to the people who need it, and where they need it to provide the best, most informed patient care possible.

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Electronic medical records also have the potential to serve as an expert system that can advise clinical care. For example, an electronic system might tell a doctor, who is about to prescribe an anti-coagulant to a patient who's taking an antibiotic, that the two drugs together might create an adverse reaction. It could ask the physician 'do you really want to do this?' to alert them to a potential mistake. From this perspective, it makes the immediate patient care better.

Databases generated from electronic medical records can also promote the health of broader populations. By aggregating patient data, these systems provide information about how drugs affect large groups of people. When optimized, this information provides for pharmacovigilance studies that could not be done before. Database information about the early clinical trials of new drugs can identify the side effects that occur in hundreds or thousands of patients. Post-marketing surveillance using electronic records has the potential to expand this to include tens, or even hundreds, of thousands of people. The statistical power can allow drug side effects to be identified much more quickly than before.

It's also important to recognize that the patient information held in databases is sensitive. People rightly have the expectation that they should maintain their privacy and anonymity. Medical records used on an aggregate scale must first be fully anonymized, or more commonly pseudonymized. In other words, the data must be coded to separate the medical information away from the personal information. Mechanisms must be in place to do that automatically to maintain confidentiality.

**Another area with great potential for future progress is global health. How do you think researchers might approach issues of health disparities so that they will have the most positive impact?**

There are many different problems involved in the issue of global health. Many diseases that are still prevalent in the developing world are now absent, or almost absent, in the developed world. There are infectious diseases in the tropics, including diseases like malaria, which is an area of research where there is a huge amount of work to be done. There are also a number of other parasitic diseases, like schistosomiasis, sleeping sickness (trypanosomiasis) and leishmaniasis. This whole group of parasitic diseases, just by virtue of their global distribution, affects poor countries at a much higher frequency than richer countries. There remains a deficit of treatments for these diseases because the market for drugs is largely focused on the diseases of wealthier people.

But an important problem for many countries results from their infrastructure. For example, implementing basic hygiene mechanisms would prevent a lot of the childhood diarrhea that is experienced globally. So, although there is much work to be done on health systems, there is also work on policy and politics that is necessary. Equally, a society is unlikely to have a very good health system without a good education system in place. So, research is not the answer to all of the global health problems – much of the necessary change must come through politics and finance.

**What methods are effective to coordinate multipronged efforts in global health?**

The Gates Foundation has an important impact on global health, and the Wellcome Trust has funded international research for over 70 years. I think that research funders must continue to make an effort to join up with those involved with health policy. As long as politics and poverty prevent the delivery of health care, many aspects of global health are much less a research issue and much more a political issue. A strategy to overcome these problems will have to combine pull mechanisms with push mechanisms. It must be a local political priority to improve medical conditions and to beat the many health challenges that are faced today.

*We greatly appreciate Sir Mark Walport's time and willingness to share his thoughts about medical research. He was interviewed by Kristin H. Kain, and this article was condensed and edited with permission.*