

Clinical science: time for a new contract

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ABSTRACT: Academic clinical medicine is widely believed to be in crisis. In particular patient-orientated research is notable for its almost complete absence from the research portfolios of many institutions. A number of recent reports have suggested ways to improve recruitment into clinical academic medicine. Here I argue that, in addition, we should realise that any such crisis is not just confined to medicine but affects most of the university sector. In medicine the situation is compounded by, first, our inability to recognise how much clinical advance occurs and, second, by a refusal to acknowledge the changing organisation and sociology of science. If academic medicine is to continue to be attractive to the brightest and most interesting minds institutional change is unavoidable.

KEY WORDS: science, research, academic, cudos, philosophy, medical research, patient-orientated research, clinical medicine, research funding

Take three consecutive editorials in the *BMJ*: in the first, the editor invokes post-modernism to explain why there are no 'scientific facts'¹; the second takes seriously a trial comparing one placebo with another placebo (homeopathy) and seeks further funding for more such studies²; and the third suggests that one way to reduce global disparities in health is to deny health professionals the freedom to move state³. It is not hard to be persuaded that academic medicine is in difficulty.

The problems of clinical medical science have been highlighted in a number of recent reports^{4,5}. Conventional wisdoms are as follows: recruitment is problematic, many clinical academics report being unhappy with their work, training schemes for clinical academics appear restrictive, stable and long-term funding opportunities are poor and the demands placed on clinical researchers crushingly intolerant of the need for space to think in. As a barometer of the times, one only needs to look at the Medical Research Council's annual newsletter reminding clinicians that they still support clinical research. How could anybody have thought otherwise⁶?

There have been several reports^{4,5} dealing with the issue of training clinical academics. They are to be welcomed. What I want to do is to expand on some issues that also merit consideration, and suggest that

there is a bigger picture which academic medicine must not ignore.

Any crisis is not confined to medicine

The first point is that any crisis is not confined to clinical academic medicine. Funding of most science, including medicine, has increased dramatically in the last quarter century^{7,8}. Judging by the number of pounds spent, science has never had it so good. At the same time, the number of scientists has grown. The assumption that funding per scientist will also continue to grow, or stay the same, is mistaken. This cannot occur: time once again to re-read Malthus.

Second, recruitment to conventional academic careers is down, not just in medicine but across the whole of the university spectrum. An academic career is, for the most able, increasingly unattractive. The reasons for this are not hard to find. Universities have become increasingly impoverished, salaries compared with comparators fallen and any autonomy or individual discretion universities once possessed sacrificed in order to bid for centrally dictated research directives that determine funding streams. Universities are no longer communities of scholars, but bureaucratic organisations bidding for contract research income. Attracting the brightest and most interesting minds, and not just in medicine, is going to be increasingly problematic for the universities.

Clinical medicine

Another issue relates to our ignorance of how clinical advance occurs and how to encourage it. In reality, I believe this to be more feigned than real. One can think of various competing models for how clinical breakthroughs occur. The first, which I have previously christened the IKEA model of advance – various components are made in the laboratory and you just self-assemble in the clinic – is woefully inadequate⁹. Like most self-assembled furniture it doesn't fit together properly, at least not without much misery and blisters. An alternative model which I prefer, christened the lava lamp model¹⁰, takes its imagery from those now retro-fashionable lamps (Fig 1). Diseases may be solved (rarely) by basic science, but often solutions come from either the clinic, or a mix of clinic and bench, and often the

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bench may not even be within a biology laboratory. Medical advance is often, to use a term from computing and communication technology, a disruptive technology. Mobile phones were developed to allow people to talk to each other but in practice most of the information stream consists of text messages which many would consider mobile phones ill suited to. Predicting the effects or the uses of technology, and in this sense medicine is a technology, is difficult. Drug development and much discovery in this regard is about the introduction of technologies. It may be hard to find a molecule to block a certain receptor but it is even harder to find a disease in which to use the molecule effectively¹¹. It is not so much that insight in the clinic replaces basic science, but that basic science doesn't specifically serve clinical science. You need both, yet this view is increasingly marginalised despite overwhelming documentary of its appropriateness. In dermatology, over 20 years ago Sam Shuster described this process¹², and in psychiatry, David Healy has mapped out with outstanding scholarship how some of the major pharmacological advances in his subject actually occurred¹³. Such accounts are, of course, uncomfortable for those at the centre. Innovation usually occurs at the periphery, has usually been rejected by the

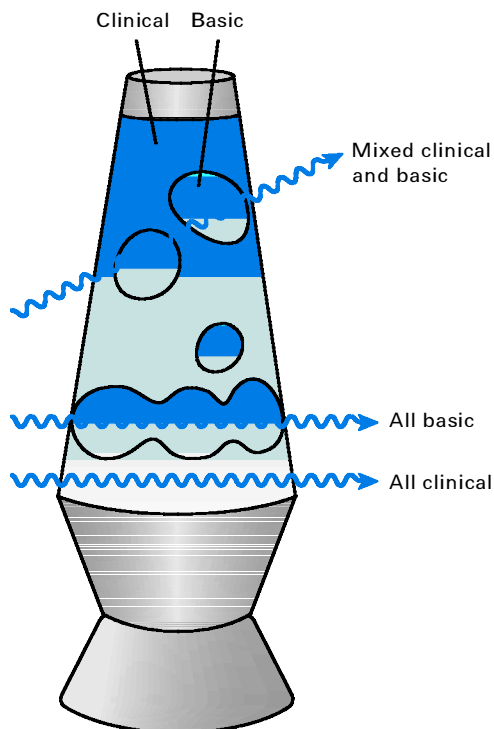


Fig 1. The lava lamp model of clinical advance. Clinical advance is represented by traversing the lamp, the liquid and the more solid material representing clinical and 'basic' science, respectively. Advance can occur by several trajectories, and there is no one path to a useful solution. Some solutions will involve just clinical science, and others will involve a mixture of basic and clinical science. Importantly, what are defined as basic and clinical science, and their relative positions, may change with time. Rate limiting is the ability to see through the lamp and then traverse it. Reprinted (abstracted/excerpted) with permission from *Science* 2002,296:698–700. Copyright 2002 American Association for the Advancement of Science.

Key Points

Recruitment to clinical academic medicine is widely perceived to be in crisis

Several reports produced by the Royal College of Physicians and the Academy of Medical Sciences have suggested ways to improve recruitment with the establishment of the tenure-track clinician scientist scheme

Difficulties in academic recruitment are not confined to clinical medicine but affect large parts of the university sector

Within clinical medicine such difficulties are compounded by a relative ignorance of how clinical advance occurs, and the changing sociology of the relationship between individual scientists and those funding research

great and the good, and frequently advance has come from people who were not considered career scientists. One should not be surprised by this latter point. Medicine is more engineering than pure science and monomaniac practitioners may be a more important source of innovation than a centre of arrogance.

Redefining medical science's contract with society

The university's financial position, and an inaccurate view of how research advance occurs, reflect to some degree the changing organisational status of science and sociology of science within society. For centuries philosophers have tried to demarcate science from other branches of human activity. In general, such approaches, however popular 'popping Popper' has proved in medical journals¹⁴, have been unsuccessful. More convincingly science can be conceived as a range of activities built on a set of norms centred around the memorable phrase that Robert Merton used to describe them – *cudos*¹⁵. *Cudos* stands for communal universal, disinterestedness and organised scepticism¹⁵. As John Ziman, writing in *Nature* recently commented⁸, Merton's norms now need updating because it is becoming increasingly apparent 'that the bureaucratic engine of policy is shattering the traditional normative frame'. Science now comes with mission statements, and failures to solve disease mean that success has to be corporately redefined. Sydney Brenner¹⁶ said several years back that eventually grant applications would consist of a flow diagram of who reports to whom – there won't be any necessity for any scientific argument, just management. Those familiar with EU framework proposals will already have a sense of *déjà vu*. Big science is also on the ascendancy with scant evidence of the need for it. Just like corporate mergers, if you can't invent new compounds, merge with another company to obscure from your shareholders the real lack of creativity and, when you do need to create a façade of competition, create little cartels to negate diversity's pernicious habit of proving some wrong. Academic science done by universities is an increasingly small part of the research sector. Corporations are now the major funders of biomedical research

and sadly, the universities and hospitals are desperately trying to imitate the corporations. As Ziman has commented, 'tied without tenure into a system of projects and proposals, budgets and assessments, how open, how disinterested and how self-critical and riskily original can one afford to be'⁸.

Futures

It would be a mistake to imagine that all is lost, or that there is a shortage of exciting science to be done, or that it has to be tied to the deadening influence of bureaucracy. Alternatives have been proposed^{17–19}. Most commentators tend to use the middle twentieth century as their reference point for how science *should* be done and organised. Historically however, science's organisational history is far richer. In the sixteenth and seventeenth centuries, following the success of the Newtonian paradigm, the Royal Society degenerated and became effectively irrelevant for the advance of science, which was carried out by individuals – largely from the North of England and Scotland – marginalised by the establishment. The professors, it seems, as has been said before²⁰, were too busy nursing their distinctions and hobnobbing with the amateurs of the nobility: fame was chosen over discovery.

My advice for medicine is clear but far from straightforward. We need to look hard at what has happened in branches of engineering, computer science and physics^{21,22}. Areas that were once the most popular and over-populated areas of science have suffered from a variety of setbacks in funding, leading to people moving into new areas, software design, information theory and the like. Medicine is going to need to redefine its intellectual heartlands and in the process not be too surprised if those most able, ambitious and young seek new 'dissenting academies'²⁰.

References

- 1 Smith R. The discomfort of patient power. *BMJ* 2002;**324**:497–498.
- 2 Feder G, Katz, T. Randomised controlled trials for homoeopathy. *BMJ* 2002;**324**:498–499, 2002.
- 3 Pang T, Lansang MA, Haines A. Brain drain and health professionals. *BMJ* 2002;**324**:499–500.
- 4 Working group of the Academy of Medical Sciences chaired by John Savill. *The tenure-track clinician scientist: a new career pathway to promote recruitment into clinical academic medicine*. The Academy of Medical Sciences, 2000. www.acmedsci.ac.uk/
- 5 Statement by the Royal College of Physicians. Research training for physicians. *College Commentary* January/February 2002;15.
- 6 Rees J. Patents and intellectual property: a salvation for patient-orientated research? *Lancet* 2000;**356**:849–850.
- 7 Ziman, J (ed.). *Prometheus bound: science in a dynamic steady state*. Cambridge: CUP, 1994.
- 8 Ziman J. Rules of the game of doing science. *Nature* 1999;**399**:721.
- 9 Rees J. Post genomics: so that is what they call clinical science. *Clin Med JRCPL* 2001;**1**:393–400.
- 10 Rees J. Complex disease and the new clinical sciences. *Science* 2002;**296**:698–700.
- 11 Healy D, Janssen P. From haloperidol to risperidone. In: *Interviews by David Healy (ed.), The Psychopharmacologists II*. London/Oxford: Arnold/OUP, 1999.
- 12 Shuster S. Understanding skin disease. *Triangle* 1987;**26**:125–138.

- 13 Healy D. *The Psychopharmacologists II*. London/Oxford: Arnold/OUP, 1999.
- 14 Rees J. Popper and knowledge. *Lancet* 1987;**i**:919.
- 15 Ziman J. *Real science*. Cambridge: CUP, 2000.
- 16 Brenner S. Loose ends. *Curr Biol* 1996; **6**:98.
- 17 Horrobin D. Effective clinical innovation: an ethical imperative. *Lancet* 2002;**359**:1857.
- 18 Horrobin D. Peer review of grant applications: a harbinger for mediocrity in clinical research? *Lancet* 1996;**348**:1293–1295.
- 19 Roy R, Ashburn JR. The perils of peer review. *Nature* 2001;**414**: 393–4.
- 20 Bronowski J, Mazlish B. *The western intellectual tradition, from Leonardo to Hegel*. London: Harper Collins, 1960.
- 21 Dyson FJ. *Imagined worlds*. Cambridge, Mass: Harvard University Press, 1998.
- 22 Dyson FJ. Essays on science and society: Science as a craft industry. *Science* 1998;**280**:1014–1015.