

Why medical research needs a new specialty of 'pure medical science'

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ABSTRACT – Sciences tend to go through boom and bust phases. Following decades of rapid expansion, medical science is now due for a collapse in overall funding. Furthermore, there has been a decline in the rate of therapeutic innovation, with fewer significant breakthroughs and little progress in several major areas of medicine such as oncology, psychiatry and autoimmune disorders. Mainstream medical research has gradually evolved into a form similar to industrial research and development (R&D), aiming at steady, reliable, predictable progress by ringing minor variations on existing approaches. Where this risk-averse approach is failing, a more speculative strategy is indicated. A new research specialty of 'pure medical science' would aim to seek radical new theories, technologies and therapies, and subject these to professional evaluation to the point where they can be applied in practice by more mainstream 'applied' medical scientists. A specialty of 'pure medical science' might be launched by financial support from patrons who wish to be associated with an elite new medical research discipline.

KEY WORDS: decline, efficiency, funding, innovation, medical research, medical science, pure science, therapeutic innovation

Increasing funding, reducing efficiency

On the face of it, the long-term expansion of medical research funding, which has probably doubled in real terms over the past decade,¹ seems set to continue. But sciences tend to go through boom and bust phases, with unsustainable growth making a speculative bubble that inevitably bursts.²

Research funding expansion was driven by revolutionary discoveries in both medicine and biology in the mid-twentieth century. In medicine, there were antibiotics, steroids, hormone replacement therapies, most of the current psychiatric drugs, and qualitative advances in the scope and safety of surgery and anaesthetics.³⁻⁵ In biology, there was the discovery of DNA as the gene, the structure of the double helix, and the unravelling of the genetic code

and gene transcription, leading to the development of molecular biology.⁶

But years of rapidly growing funding have probably led to increased inefficiency and misdirected research efforts. Over recent decades there has been a steady improvement in most aspects of clinical practice, but a decline in the frequency of major 'breakthroughs'.³⁻⁵ Yet claims of the importance and success of medical research have grown more extreme with 'hype' and 'spin' becoming expected elements in the communication of clinical science via the media.⁷

This combination of a reduction in the numbers of breakthroughs and an increase in public relations activity has led to a widening gulf between the perceptions of the beneficiaries 'inside' the research establishment and 'consumers' on the outside: insiders feeling that things are good and getting better, while disillusioned outsiders see more and more resources producing less and less in terms of 'here-and-now' clinical benefits. A topical example is the contrasting perceptions of the Human Genome Project.

The expected collapse in overall funding levels, however, may also be accompanied by the evolution of a new elite research specialty in the field of 'pure medical science' with a mission to seek radical breakthroughs in the management of major unsolved clinical problems.⁸

The need for pure medical science

Perhaps the major deficiency of current therapy is the lack of significant progress in treating common cancers – such as brain, lung, bowel, prostate, ovary and breast – which together make-up the main cause of mortality in developed countries. Treatment of cancer is still based on long-established methods such as surgical excision, radiotherapy and cytotoxic chemotherapy. These techniques have improved incrementally over several decades to yield more remissions and cures. But the rate of improvement seems to have levelled-off, and there have not been many major therapeutic breakthroughs.

Recent advances in cancer therapy typically offer only modest or marginal benefit, detectable only in very large clinical trials, and usually lead to severe side effects.⁹ Assuming that the public continue to

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demand cures or much better treatments, sooner or later this will trigger the growth of more effective ways of conducting cancer research. The same would apply to other therapeutically-stagnant areas of medicine such as psychiatry and autoimmune diseases.

Mainstream medical research nowadays operates much like traditional industrial research and development (R&D), aiming at steady, reliable, predictable progress.¹⁰ In addition, modern medical research is subject to ever-more intensive pre-publication peer review, which aims to ensure that the published research is valid, and ready for application by other applied scientists.¹⁰ All this makes mainstream medical research increasingly risk-averse, since the only way success can be guaranteed is by the accumulation of small extrapolations from current knowledge. When minor variations on existing approaches do not lead to useful progress, there is sadly not much incentive to make bigger and more speculative leaps since these are less likely to be funded and more likely to fail.

What seems to be required is the ‘pure science’ approach of developing a variety of competing radical theories, technologies and therapies, and subjecting these ideas to specialised professional evaluation.⁸ For example, medical research in oncology might consist of a majority of applied R&D scientists who would continue working on developing incremental improvements. But there would also be a smaller scientific elite group of ‘pure’ oncologists whose role would be to develop, evaluate and refine radical new approaches. Such pure medical scientists would publish their ideas in original papers and reviews, referee each others’ work, interact by telephone and email, meet in conferences, elaborate theories and conduct experiments etc – just as the applied scientists do at present.

Pure oncologists would also apply for funding from specialised and peer-reviewed agencies, but with the important difference that they would be evaluated using distinctive criteria from those used to evaluate applied scientists. Since the aim would be to produce qualitatively novel approaches to understanding and treating cancer, the potential importance of theories, technologies and therapies would weigh more highly than their probable success. Pure medical scientists would not be constrained by the necessity to provide knowledge ‘ready for implementation’.

The applied scientist could turn to this ‘pure’ research system for suggestions when they were in need of novel theories or techniques to extricate them from a therapeutic dead-end, or past an obstacle which is not yielding to the more usual strategy of minor-variation, trial and selection. Conversely, the pure medical scientists would ideally be located nearby to, and interact with, applied scientists in the major international

research institutions – so that they are thoroughly conversant with the best of current practice.

Future possibilities

At present pure medical science is published in journals – for example, *Medical Hypotheses* which I edit – but the papers tend to be evaluated by inappropriate criteria of short-term, predictable validity when judged by the standards of existing practices. Naturally, most pure medical science communications are rejected out-of-hand by hard-nosed R&D-type medics as being unready for immediate application.

But this throws out the gold with the dross. Among a mass of mistaken publications there are probably a few potentially major breakthroughs. For the potentially valuable ideas to be sifted from the erroneous and incompetent ones, pure medical science needs evaluation (conceptual analysis and experimental testing) by a peer group of experts in the same field who have the same overall objectives of discovering ideas with latent positive transformative possibilities. In other words, there needs to be a specialist professional social system of pure medical science, just as there is for the applied sciences.¹¹

The most probable way that a specialty of pure medical science could be ‘launched’ would be the establishment of new research units under elite leadership at some of the most prestigious world-class universities, and attached to the leading mainstream applied medical science units.⁸ Such a high-status constellation would probably prove attractive to state and private patronage, and might provide viable growth points for a more effective and efficient model of medical research in the lean decades after the funding bubble finally pops.

Pure medical science might be considered just another one of those ‘good ideas’ which are published and then disappear, unevaluated. But if continued medical progress is wanted, and assuming that present approaches continue to disappoint, then a social system of pure medical science will probably arise – although perhaps under a different name and in a somewhat different form.

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Key Points

Medical science is declining in efficiency and effectiveness

Medical science is due for a collapse in funding

A new research specialty of ‘pure medical science’ is proposed

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