Better support translational research

Translating scientific discoveries into real world solutions is a goal shared by researchers, governments, industry and the public alike. While continued support for basic research is critical, improvements in the funding, evaluation and publication of translational work are also needed to fully realize the promise of applied research.

Scan job advertisements, funding calls, and institutional mission statements and you will find terms such as 'translational', 'bench to bedside' and 'applied' frequently popping up. While each term can have its own distinct definition, they represent a push to turn lab-based discoveries into tangible solutions for real world problems. One needs only to look at microbiology to appreciate how translation of so-called basic research — the study of fundamental processes without a direct link to application — can lead to major medical advances. Since the discovery of microorganisms, centuries of basic research have helped elucidate microbial growth mechanisms and this in turn has enabled us to design drugs for treating infections in the clinic. Conversely, research in industrial settings has produced fundamental discoveries (e.g. demonstration that CRISPR–Cas act as phage restriction systems arose from applied research into yogurt production).

In the past two decades, there has been a push politically and from funders for academic researchers to explore the translational potential of their work. In 2003, the US National Institute of Health (NIH) Roadmap announced the Common Fund (US$675 million budget in 2016), which is a venture capital-like initiative aimed at specifically developing transformative research tools and funding translational studies (https://commonfund.nih.gov/). For example, the Roadmap-funded Human Microbiome Project has been a key source of datasets and genomic tools for the microbiome field. Similarly, the UK National Institute for Health Research has invested in 20 translational research facilities, with the new NIHR Imperial Biomedical Research Centre recently announced (https://imperialbrc.nihr.ac.uk/); such investments have produced nearly 100 patents, quadrupled intellectual property revenue of £120 million and attracted over £1.5 billion in funding from private charities[1].

Uniting proof of principle studies with therapeutic development can potentially accelerate the time basic discoveries make it to clinic. Translational studies also provide opportunities for interdisciplinary collaboration, which will bring in new ideas from disparate fields and can help to identify gaps in understanding that open up new fundamental research avenues.

However, academic researchers need more support in developing translational research programs. According to a 2013 survey of translational researchers, 62% of respondents felt that limited funding was a major barrier to developing applications from their research[2]. On closing this gap, there is concern that money for translational work may be siphoned from basic research budgets, and that translational goals would become the sole driver for academic research. As has been well-argued previously[3], demanding translational appeal in basic research projects could stymie transformative discoveries, which would only further deplete the translational pipeline. Indeed, a recent Canadian review reported that a decade of science funding pushing industry-oriented research alongside cuts to basic research had decreased Canada's international scientific standing[4]. Thus, funding translational work cannot be a replacement for basic research, but rather needs to operate in parallel, available when the fruits of basic research are ripe.

Beyond apportioning more money for applied research, a 2016 study found that interdisciplinary projects were less likely to be funded[5], a potentially serious problem given that interdisciplinary research is seen as an important incubator for innovation. While the causes are not fully clear, concerns such as lack of appropriate and diverse expertise on review panels, bias towards familiar topics, and researcher difficulties in meeting demands for significant preliminary data and resources could play a role. Identifying and evaluating interdisciplinary proposals under separate funding frameworks may provide such projects fairer competition at their inception[5,6].

Finding collaborators and resources is also a challenge[2], as unfamiliar fields can present significant obstacles to the uninitiated. To address some of these concerns, governments and independent organizations are increasingly supporting interdisciplinary centres. For example, the NIH Clinical and Translational Science Awards provide US$500 million annually to over 60 US-based research hubs to fund resources including clinical trial biostatistics and patient recruitment support. However, there is also a need for greater access to translational expertise for the broader scientific community, especially at early stages (73% of translational researchers felt industry advice would benefit their projects, but only 27% were able to access it[2]).

Finally, how translational research is evaluated and recognized should be reconsidered. As the timescales involved in realising applied goals can differ substantially from those in basic research, institutions should consider alternative metrics of researcher output including patents, tools and software in hiring and tenure decisions. Journals also have a part to play in promoting translational research. *Nature Microbiology* seeks to publish work linking basic research with translational angles; for instance, we have published studies on new antimicrobial development as well as explored the potential for using microorganisms as therapeutics, and in this issue, Recker et al. identifies *Staphylococcus aureus* genomic features that correlate with patient mortality[7]. Our interest in applied work is of course not limited to medicine, as in this issue, Lambert and Raina et al. develop a microfluidic chip for in situ analysis of marine chemotaxis[8].

It is increasingly clear that tackling grand societal challenges requires collaborative, interdisciplinary research from diverse sectors. While it is important that basic researchers help find these solutions, more work needs to be done to support translational and applied work and smooth the path for these promising discoveries to emerge. ❐

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