
Summary

- There has been notable progress in technology transfer and commercialisation over the last decade, towards which biomedical research makes a significant contribution. This has been enabled through an increasingly collaborative approach to commercialisation across industry, academia and the wider healthcare sector, and it is important that these partnerships continue to be fostered and built upon to maintain the UK's position as a leader in translation of scientific discovery.
- Industry-academia partnerships should focus on collaboration, with greater value derived from exchanging common objectives, knowledge and complementary skills, rather than the historical model that focused narrowly on financial gain.
- Recent advances in biomedical science have resulted in more rapid development of translatable discoveries and generation of IP. This has benefitted research by increasing the number of opportunities for engagement with industry, but may place further pressure on the resources of Technology Transfer Offices (TTOs) which could potentially impede the translation process if appropriate resource is not available.
- There is no 'one size fits all' model for technology transfer and IP strategies, which will differ greatly across different research areas and disciplines. With this breadth of research opportunities, it can be challenging for TTOs to have an in-depth knowledge of different types of IP, and therefore steps should be taken to ensure that academics themselves are also supported to understand the value of their research and the commercialisation process. In addition, it is important to ensure that protection of IP does not hinder scientific research and discovery, and that appropriate IP strategies are carefully considered for each new technology to avoid unnecessary or untimely patent filings, or publication of important discoveries without sufficient attention to the IP strategy.
- Sharing of best practice in technology transfer should be encouraged across universities and TTOs. The pooling of TTO resources between universities could ensure that they have the expertise to cover the range of technologies.

Introduction

The Academy of Medical Sciences promotes advances in medical sciences and campaigns to ensure that these are translated into healthcare benefits for society. Our elected Fellowship includes the UK's foremost experts drawn from a diverse range of research areas, from basic research through to clinical application and commercialisation. One of the Academy's key strategic priorities is to link academia, industry and the NHS in order to foster closer working relationships and greater collaboration in the life sciences. Our FORUM programme, for example, provides an independent platform to bring together academia, industry and the NHS to take forward national discussions on scientific opportunities, translational challenges and strategic choices in healthcare.

The Academy welcomes the opportunity to respond to the House of Commons Science and Technology Committee's inquiry into managing intellectual property and technology transfer. Our

response is based on the views of the Academy's Fellows with experience drawn from pharma, biotech and universities.

Our responses to five of the key areas outlined within the inquiry can be found below.

1. How the respective roles of universities and TTOs in commercialising research have developed over the last decade

The Fellows that we consulted were supportive of the role of TTOs. They were aware of some examples of TTOs impeding collaboration and commercialisation discussions with industry, but this has sometimes been the result of insufficient resourcing of the TTO. TTOs must act as an enabler of, rather than a barrier to, partnership and so it is important to continue to support and strengthen the role of UK universities and TTOs in technology transfer and commercialisation.

In general, commercialisation of research has been supported by an increase in translational funding from organisations such as the Medical Research Council (MRC), Wellcome Trust and Innovate UK (for example the Cell and Gene Therapy Catapult), which offers valuable support for innovation and translation of research. In addition, the inclusion of 'impact' criteria in the Research Excellence Framework (REF), and impact plans in applications for Government-sponsored research grants, have raised awareness of technology transfer and highlighted the value of research translation and academia-industry collaboration.

Over the past decade the life sciences sector has seen a shift from industry being simply a source of income for universities, towards an increasingly collaborative approach. This has been propagated through recognition of the wider opportunities and significant value provided by these partnerships, beyond payments to the university. It is essential to ensure that these synergistic partnerships continue to build on common objectives and complementary skills to deliver value through knowledge exchange, rather than simply focusing on financial relationships. This shift has been particularly visible in the life sciences sector where recent technological advances such as those in drug discovery and genomics, have rapidly increased the generation of commercially attractive research opportunities and supported a move towards open innovation with higher numbers of industry-academia partnerships.

2. How well universities and TTOs balance objectives of protecting IP and encouraging public-benefit research, and whether TTOs' and universities' IP strategies effectively deliver such objectives in practice

It is important to achieve a balance between protecting Intellectual Property (IP) through patents, and enabling UK academic researchers to move quickly to publish work when working on scientific discoveries with potential commercial value. Early filing of patents so that publication can occur, with less consideration for next steps, can be damaging in some cases. Negotiations regarding IP and publications as part of academia-industry collaborations can be challenging, and although many universities are able to manage this balance effectively, there are still some experiences of over-protectiveness of IP. At present, collaborations and IP arrangements are most commonly carried out through licensing of IP, and in the future this will likely shift instead towards developing broader, more holistic partnerships between academia and industry as the number of partnerships increases.

Although universities need a high-level IP strategy with general guidelines and broader objectives, it is also important to realise that there is no 'one size fits all' model for technology transfer. Areas of research will differ in terms of the value of IP, publishing requirements and the level of competition, and therefore should be considered individually. TTO's activities should be aligned with the university's overarching strategy and generating sustainable income through commercialisation should not be the primary goal for research activities.

3. Any scope for individual universities/TTOs to adopt particular good practices and IP strategies from others

Sharing of best practice should be encouraged and facilitated across TTOs and universities to consolidate learning and foster best practice. TTOs manage a breadth of technologies and disciplines and it is challenging for TTO staff to acquire the in-depth knowledge of all of these areas - and associated IP - required to fully understand commercialisation opportunities. It is important that universities ensure that there is a robust understanding of the value of a technology, and a clear rationale for filing a patent, otherwise patents which are unlikely to be valuable could be filed, or other important discoveries could be published without consideration for the IP strategy.

TTOs could consider pooling resources, so as to have experts between them that can cover most areas of science and industry with a reasonable level of expertise. Life science clusters may be able to play an important role here in pooling of resources and sharing best practice, as well as supporting engagement and collaboration between academia and industry.¹ Additionally, it may also be useful for universities to appoint external commercial advisors with experience in particular technology areas to support academics in understanding the value and IP of their research.

Given the challenge of having TTO offices that have sufficient breadth of knowledge, and the greater level of partnerships between academia and industry, it is important that support and training are provided for academics around IP and technology transfer to help them to understand the value of their research and to nurture entrepreneurship. We support the recommendations made in the Dowling and McMillan Reviews in this area.^{2,3,4} We also welcome schemes such as the Royal Society Industry Fellowships and the Royal Academy of Engineering Enterprise Fellowships, which provide support to researchers for entrepreneurship.

4. Whether funding arrangements for research commercialisation by TTOs are adequate and whether they facilitate an appropriate balance of objectives and an appropriate balance between short-term and longer-term aims

¹ The Academy of Medical Sciences FORUM (2015). *Geographical clusters*. <http://www.acmedsci.ac.uk/download.php?f=file&i=32417>

² Department for Business, Innovation & Skills (2015). *The Dowling Review of Business-University Collaborations*. <http://www.raeng.org.uk/publications/reports/the-dowling-review-of-business-university-research>

³ Higher Education Funding Council for England (2016). *McMillan review of good practice in technology transfer*. http://www.hefce.ac.uk/media/HEFCE,2014/Content/Pubs/Independentresearch/2016/University,KE,framework,Good,practice,in,technology,transfer/2016_ketech.pdf

⁴ The Academy of Medical Sciences (2015). *Response to the consultation by Dame Ann Dowling on university-business collaboration*. <http://www.acmedsci.ac.uk/download.php?f=file&i=30976>

As outlined earlier, there has been an increase in the volume and diversity of translational research funding in the UK over the past few years, providing valuable infrastructure and support for academia and small-medium sized enterprises (SMEs). However, recent advances in medical science have resulted in more rapid reporting of discoveries and generation of IP. This may place additional strain on TTO's funding arrangements by increasing the diversity and volume of protectable discoveries and opportunities for business engagement and commercialisation. Without appropriate resources, the increased workload and costs to the TTO could act as a barrier to translation of new discoveries.

A long term view often needs to be taken with licensing agreements when measuring investment and the success of commercialisation as in many cases, the greatest value of IP does not come from the sale of patents or royalties but from execution of IP in terms of manufacture in, and sale of products from, the UK. While the MRC and Sir Greg Winter have earned significant amounts of money from the patent on monoclonal antibodies, the manufacturers of the resulting drugs have earned orders of magnitude more from their products. Therefore universities could take a long term view in licensing negotiations and be prepared to share risk and forgo short term gains for bigger rewards on successful launch of a product. However, this would need to be carefully balanced against the current environment where product development often fails.

5. Whether SMEs and larger businesses are both given an equitable access to commercialisation opportunities

There appears to be relatively equitable access to commercialisation opportunities for both large and small businesses, however, SMEs require appropriate resources and support in order to access these opportunities. For example, large companies may have multiple avenues for engagement around different specialisms when compared to an SME with more limited resource, which could hinder access to commercialisation opportunities. Funding should continue to be made available to SMEs to allow them to innovate and engage with universities and in particular, Knowledge Transfer Partnerships have been cited as a highly useful resource for supporting this.

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