Industrial–academic collaboration: a bridge too far?

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Anyone working in academia or within the pharmaceutical industry is aware that unprecedented changes are occurring, both in the nature of the research and in its instigation. The push to commercialize research and increasing demands on government and charity resources, coupled with diminishing status, derisory salaries and career uncertainty, means that many academics are turning to industry either to finance their research or as a career. Academics are also facing tough choices between purely academic and sharply focused applied research. This has created a very exciting environment, but has also raised several difficult and challenging issues. This article, drawing largely on personal observations, will highlight some of these issues and address the question of whether a supportive climate is really being provided for academics to carry out applied research.

The role of the academic?

These days, even the role of the academic is poorly defined. At its heart is 'academic freedom' (gradually being eroded), which can be defined as self-fulfilment by carrying out academic imperatives (such as teaching, research or related administration). These, albeit unstructured, career paths do exist within the majority of academic institutions. Although most academics are contracted to teach, recruitment and success are judged by the ability to publish and raise research money (particularly that which brings in overheads). Some academics are funded by outside bodies solely to carry out research. Scientists in this position face tremendous pressure, being selected to carry out research yet not having an alternative (i.e. teaching or administration) if their progress or enthusiasm wanes. These individuals often have to contend with short-term contracts and unfavourable funding policies. For example, some charities do not fund academics salaried by research councils or industry, thereby reducing their likelihood of success in their chosen role.

With this in mind, the financial security and excellent research resources offered by industry, either through collaboration or by direct employment, appear extremely attractive. Indeed, an increasing number of young scientists and academics are beginning to realize this. However, many still remain in academia and are reticent to move into industry. Their reasons for not doing so might include the loss of academic freedom and the thought of carrying out routine research. Furthermore, many fear being forced to work in areas of no interest to them, and perhaps, even fear 'leaving the nest' – academic environments, for all their professional disadvantages, can provide a low-stress comfort zone for those in the early stages of career development. Another factor is that a large proportion of academia is still both critical and sceptical of industrial funding, claiming that commercialization detracts from 'pure' research. It is revealing, though, that virtually all grant applications require a section on the expected benefit of the results and their commercial potential and, for some types of EC application, the presence of an industrial collaborator is an important asset. Hence, the expectation to commercialize is there from the start of the research process, and traditional academia now implicitly recognize this.

Academic versus industrial imperatives: can they be overcome?

For those who forge industry links, a new and practical set of challenges emerge. In recent years, I have run an extensive collaboration between a UK and a Japanese pharmaceutical

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company looking for modulators of a particular class of ion channel. The origins of the project are illuminating. Firstly, as a pharmacologist, I felt that an exciting and innovative way to make a significant impact would be to collaborate with chemists and biochemists. Knowing that it would be impossible to raise enough money from the risk-averse regular sources of charity or government funding, the obvious route was industry. Eventually a deal was struck and the project, which involves using state-of-the-art technologies to search for a drug candidate, initiated. Although the work has progressed well, balancing industrial and academic imperatives has presented various challenges to the project from the beginning.

As an academic, the deal provided an excellent budget for constructing a sound infrastructure within my laboratory. This was used not only by the project workers, but also by other members of the laboratory, and the overhead benefited both the department and the university. Furthermore, the project researchers obtained good industrial experience with some academic freedom and the knowledge that they were acquiring skills to make them highly employable within the industry (these days, few young scientists are tempted to remain in academia beyond the first post-doctoral position or even a doctorate).

The collaboration also has its disadvantages. The objective of the project has been to produce a drug candidate, clearly a desirable aim both from academic and commercial perspectives. After all, what more could a pharmacologist want? However, this highly focused research carried out in an academic institution provoked mixed reactions from the personnel involved. The biologists often appeared frustrated with having to produce detailed, regular reports full of exciting science that they will be unable to publish or follow up, either because of pressures to meet the project's commercial goals or because of the short-term nature of their contracts. This has seemed less of an issue for the chemists for whom the project's demands continually coincided more directly with academic challenges.

Issues for the industry

The benefits offered to the industry by such a project include access to considerable and unique expertise not available in-house. Furthermore, the collaboration has eliminated the need for our industrial partners to recruit permanent staff to pursue a relatively high-risk project. In addition, it forged a link for them with a leading western academic institution that also offered easy contact with other academic disciplines. From the perspective of the academics, the major disadvantages of the project for our collaborators have been twofold. Firstly, our inability to change direction quickly because of a fixed human resource skill limited by the contractual arrangements of post-doctoral appointment slows progress. Secondly, our desire to carry out academically publishable work has been viewed as a distraction from the commercial goals of the project. Clearly, intellectual property has to be protected, but the publishing and open discussion of interesting non-proprietary findings is the life-blood of the academic, and thus, these restrictions are directly opposed to the professional imperatives of the academic.

This situation, although understandable by the academic and justifiable by the industrialist, is frustrating but can be managed. However, attempts are being made to overcome this difficulty by not unreasonably withholding publication, or by agreeing to file patent applications rapidly, thereby placing the intellectual property in the public domain. Perhaps of much wider importance is the possibility of changing patent law itself. In the US and Canada, there is a one-year 'grace period', where a valid patent application can be filed after a public disclosure, a system not accepted by other countries despite attempts to harmonize patent law internationally [Crespi, R.S. (1998) *Trends Biochem. Sci.* 16, 449–489]. In the absence of radical solutions, the best approach to meeting both academic and industrial imperatives is good communication and broad-minded understanding of academic and industrial management.

Value judgements and non-academic challenges

Personally, I thrive on a balance of applied and basic science and do not have difficulties confronting the issues raised here. Applied projects, though, are not always well regarded in academic institutions, still being viewed by the competitive majority as not 'real' science. However, there is light at the end of the tunnel, as in the forthcoming UK Research Assessment Exercise (a system of rating academic departments on the basis of head count, research income and publication output), industrially funded research might carry some weight. This might encourage more individuals to get involved, and they might then discover that combining science and commerce is both exciting and inspiring, this certainly being my experience.

In fact, enthused by my industrial collaborations, I worked with a colleague at Cambridge University, UK (Jonathan Blackburn, a biochemist) to set up a spin-out company (SenseTherapeutic Ltd) to develop novel drug discovery technologies [*SCRIP* (1999) 24000, 11]. Our business model involves outsourcing all initial research to academia, my belief being that academia can be an excellent forum for applied science. However, getting the company off the ground posed some interesting challenges, especially when trying to present a case that convinced both the scientist and the businessman. Pulling together several academic institutions to carry out the research raised some difficult problems and proved particularly complicated. An apparent lack of understanding of both biotechnology and the company's ethos resulted in delays which, in the fast moving biotechnology sector, could have

resulted in the loss of our competitive advantage or even loss of the opportunity. It still appears that administrators are sceptical of scientists directly putting their ideas into action.

Conclusions

Despite an outward push to encourage academics to liaise with industry and to generally commercialize their research activities, there is often institutional resistance to involve academics in commercialization. This situation is paradoxical, as both academic institutions and funding bodies are keen to commercially exploit the fruits of the academics they support. Indeed, both the providers and the recipients of research funds have a mission to ensure that they commercially capitalize on grant-funded projects. Paradoxically, the conditions for funding research and subsequent ownership of intellectual property appear to be tightening to the extent that fewer incentives exist for academics to carry out applied science. Hence, despite encouragement to liaise with industry, it might be asked what attraction academia still offers for the academic interested in applied research.

I am unable to offer any instant solutions to the issues raised above, nor do I pretend that there is a single clear answer. However, science must be made attractive to those making early career choices, and adequate security provided for individuals to follow their instincts. A broad-minded approach needs to be taken to the concept of academic freedom. Policy makers and those holding the purse-strings of research must not focus too sharply on ownership of individuals and their minds, but instead, provide a mentoring environment that encourages and elevates the status of applied science. Otherwise, the weak bridge spanning the gap between academia and industry will never be completed, an eventuality that must not be allowed to happen.

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