Open day review: bridging the gap between academia and industry

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Academia is currently undergoing unprecedented changes in the way it is both funding and instigating its research. The drive to commercialize research, combined with increasing competition for limited sources of government and charitable funding, means that some academics are turning to industry, either to finance their research, or as a career move. Academics are also facing tough choices between pursuing purely academic research and sharply focussed applied research. This has created a very exciting environment, but it has also raised a number of difficult and challenging issues.

The University of Bristol has a mission to build commerce on a strong technology base. To this effect, the University has set up the Bristol Enterprise Centre (BEC) following its successful bid under the government's Science Enterprise Challenge. BEC is seeking to forge strategic partnerships with commerce and industry, so as to foster an entrepreneurial culture, thereby supporting innovation and wealth creation. It is against this backdrop that the Department of Pharmacology set up an open day for industry, aiming to enhance existing, and forge new, links between academia and industry.

The open day was structured in such a way that a panel discussion followed each day of scientific talks, providing an opportunity for academics and industrialists to air their views on the merits of academic–industrial collaborations. The panel consisted of both research representatives (John Lackie, Yamanouchi Pharmaceutical Company, West Byfleet, UK; and Darren Hart, Sense Proteomic, Cambridge, UK) and business representatives (David Ricketts, Inpharmatica, London, UK; and Phil Luton, Centre for Applied Microbiological Research, Porton Down, UK) from the pharmaceutical and biotechnology industries. Initially, Peter Roberts (Head of Department, University of Bristol, Bristol, UK) described recent developments within the department, which have included the complete refurbishment and expansion of the laboratories. He also summarized the department's principal research area, which is cell signalling: ranging from synthesis of pharmacological tools, ion channel biophysics and molecular pharmacology, to *in vivo* studies.

Scientific collaborative discussions

Roland Kozlowski (University of Bristol) started the scientific proceedings by describing a collaboration with colleagues from the EU and Sense Proteomic, for which he is CEO. Sense Proteomic will be creating arrays of functional proteins to identify novel binding partners to cytosolic domains of the cystic fibrosis transmembrane regulator (CFTR). This should help to identify potential new ways of either enhancing CFTR activity or assisting its translocation to the membrane, aspects that would be worked on in collaboration with scientists at Bristol and elsewhere in the EU.

Graeme Henderson (University of Bristol) described his work on the role of purinergic P_{2X} receptors in the enhancement of neurotransmitter release by mesencephalic neurones, which was initiated in collaboration with GlaxoWellcome. He highlighted the potential for novel drugs for controlling pain, but suggested that there is a need for more effective agonists and antagonists, particularly agents that will cross the blood–brain barrier.

Eamonn Kelly (University of Bristol) talked about the physiological and pathophysiological importance of receptor desensitization and suggested that this is an exploitable target for drug therapy. For example, the use of β-adrenoceptor agonists in congestive heart failure is surprisingly disappointing, with the heart failure becoming worse. This is likely to be, at least in part, a consequence of G-protein-coupled receptor kinase II (GRKII)-mediated receptor desensitization. Similarly, in asthma, 40% of sufferers carry a polymorphism in the β-adrenoceptor, increasing susceptibility to GRK-induced desensitization. Thus, in theory, GRK and arrestin inhibitors could improve the efficacy of therapies involving agonists at G-protein-coupled receptors. A key research area to be tackled would be the selectivity of such inhibitors, to avoid undesirable side effects.

Alastair Poole (University of Bristol) discussed problems with current approaches to influencing the pathophysiology of platelet activation, such as the use of aspirin and fibrinogen. He suggested an alternative approach, involving the targeting of early adhesion events, and has developed a novel cell-functional assay system based on cell signalling events.

Kanamarlapudi Venkateswarlu (University of Bristol), who also has a particular interest in intracellular signalling processes, described the many roles of phosphatidylinositol (PI) 3-kinases in

1359-6446/01/$ – see front matter PII: S1359-6446(00)01625-1

normal and abnormal cell function, and suggested that these enzymes might represent new therapeutic targets. For example, in both lung and ovarian cancers, PI 3-kinases are constitutively active. To further this work, Venkateswarlu described the development of a novel fluorescence resonance energy transfer (FRET)-based PI 3-kinase assay that would enable rapid investigation of potential inhibitor molecules.

Maria Usowicz and Neil Marrion (both University of Bristol) described their respective investigations into neuronal ion channel function. Usowicz focussed on novel isoforms of P-type calcium channels, which present possible novel therapeutic targets in a wide range of channelopathies, including absence epilepsy, chronic and episodic cerebellar ataxia, familial hemiplegic migraine and aspects of cognition. Marrion continued the calcium channel theme, discussing functional coupling between the various calcium channel types found in hippocampal neurones. Modulation of the poorly characterised calcium-activated potassium (SK) channels can alter cognitive function, particularly in aged animals.

David Nutt (University of Bristol) gave an overview of the Psychopharmacology Unit's work on the pharmacology of sleep disorders and anxiety. He described the exciting application of human neuroimaging to quantitatively probe the involvement of specific neurotransmitter systems in these disorders and the effects of specific drugs.

Industrial–academic collaborative issues

Following scientific discussion, the focus shifted to more general issues relating to industrial–academic collaboration. One of the major criticisms raised by the panel was of university Industrial Liaison Offices (ILOs), whom industrialists deemed bureaucratic, inefficient and unrealistic with respect to revenues from potential collaborations. Representatives from Bristol University's ILO equivalent stated clearly that their policy was to be industry-friendly, and that they have put together a commercially aware and experienced team to resolve such issues. Indeed, academic and industrial institutions are working together to produce a standardized application form for structuring collaborations. A second significant criticism raised was that ILOs have no understanding of value. Both academics and industrialists agreed that a patent is a long way from a product and that universities should not expect huge royalties in the absence of financial risk (in researching a product that might require many years of development and high costs).

Much discussion followed in relation to forming collaborations. Industrialists stated that large companies receive hundreds of requests for funding academic projects. It was expressly stated that 'cold-calling', that is, a short proposal of ~500 words, would be enough to generate interest. All were in agreement that it is essential to find a 'corporate champion' to push the project forward internally. The issue of costs was also raised, and the industrial panel suggested that industrialists would be happy to pay for full overhead costs, providing that they are properly justified.

Pure versus applied research

A topic of considerable discussion was whether or not academics should carry out contract research. The consensus of the academic and industrialist representation was that, generally, academia was poorly suited to this activity. Indeed, the panel felt that academia is better placed to carry out open-minded research without the constraints of working towards a specific commercial end-point, allowing industrialists to tap into research expertise and new areas as they develop. This, however, conflicts with the government's current obsession with innovation and commercialization of research. Should academics be actively involved in creating, and perhaps running, spin-off or start-up companies? It was felt that such issues are best handled through the host institution and a view taken on the qualities, personality and skills of the individuals involved. The academic representation present, however, felt that such companies could represent a drain on staff who could lose interest in their academic duties. However, all agreed that such organizations represent an excellent way of exploiting the universities' intellectual property (IP), in concert with licensing, which was regarded as much more straightforward. The ease of handling chemistry IP versus biology IP, because of the more structured and goal-orientated nature of the work, was also noted. Issues relating to confidentiality and dissemination of scientific information, and obtaining a balance between the two, were also discussed.

Academics at Bristol University felt that industry should give greater consideration to the funding of postdoctoral scientists, who provide real expertise and enhance research productivity, rather than the current pattern of supporting the training of PhD students through CASE/Collaborative Award schemes. There was a consensus of agreement with the role that universities should play, in that they should not train students for a particular industrial job (e.g. combinatorial chemistry), but produce students with a variety of transferable skills, combined with knowledge in a specific discipline, for subsequent training by a company. Industrialists highlighted that a small research project often represents a link into a good research group.

Summary

In conclusion, the meeting was viewed positively by academics, industrialists and administrators. The scientists generated considerable interest with some positive follow-up. Above all, it was clear that Bristol University is working to support the bridge that already spans the gap between academic and industrial pharmacology.