biotech focus

Glasgow and the West of Scotland region – bioscience buds beginning to bloom

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By some criteria, Scotland should not be a prime area in which to have a biotech cluster; it lacks some of the core ingredients of the more-successful hubs. Most notably, Scotland does not enjoy a strong presence of traditional pharmaceutical research and development facilities that act as drivers and clients for start-up companies. Nonetheless, Scotland has been undergoing something of a biotech boom. The past five years have seen year on year growth in the number of companies in the sector – >20% every year, comfortably beating the European average of 5%. There are >500 organizations in Scotland's life-science community – employing >26,000 people and, with a population of ~5 million (~8% of the UK total), Scotland is now home to 20% of the UK's life-science companies.

Other contributions in this issue of *Drug Discovery Today* deal with the Edinburgh and Dundee success stories. Here, we look in detail at the Glasgow and West of Scotland region (Figure 1), which supports 40% of the Scottish life-science community (200 companies employing 8000 people).

Academic and research base

The boom in bioindustrial activity is undoubtedly driven by Scotland's powerful academic base. Life sciences constitute a focus for education, research and drug development in Scotland and the West of Scotland in particular. Glasgow has the largest number of students and produces more life-science graduates than any UK city outside London. Scotland produces 13.2% of the UK's first life-science degrees and 61% of the UK's pharmacy degrees. The country also contributes an impressive 30% (each) of the total number of microbiology and genetics PhDs awarded in the UK. Four of Scotland's 13 universities are in the West of Scotland area and, along with two world-renowned research institutes, fuel regional innovation. Scottish Enterprise estimates that >50 academic institutions in Scotland are engaged in drug discovery.

Academic–industrial collaboration

Several initiatives are in place to harness the potential of the academic base. One such initiative is PharmaLinks, set up to foster collaboration between Glasgow and Strathclyde Universities, combining the basic research and early drug development experience of the former with the late-stage drug development and applied research background of the latter. PharmaLinks has recently announced a £9 million deal with Bioaccelerate, a drug development company, to develop technology to help patients with heart disease.

The Scottish Biomedical Foundation was established in the mid 1990s by a consortium of Scottish universities with the aim of marketing their collective expertise in medical and biomedical research. This initiative has fostered several major collaborations including Yoshitomi Research Institute of Neuroscience in Glasgow (YRING, Glasgow and Strathclyde Universities) and Kowa (University of Strathclyde).

Established in 1997, YRING is a major collaboration between the Universities of Glasgow and Strathclyde, as well as Mitsubishi (formerly Yoshitomi) Pharmaceuticals. Directed by Professors Morris (Glasgow University) and Pratt (Strathclyde University), it is a highly successful target discovery and disease characterization institute, with a schizophrenia research programme involving novel gene identification, functional brain imaging and complex behavioural analysis of the effects of gene manipulation *in vivo*.

Scottish pharmaceutical industry

Although only a few pharmaceutical companies are represented in Scotland (e.g. Organon, Newhouse) nearly 50% of the UK industry's manufacturing facilities are based here. The West of Scotland has an enormous concentration of clinical drug development experience, both in the universities and in the large number of contract research organizations (CROs) that are centred around Glasgow. In the whole of Scotland, there are >200 CROs. Being top of the UK's list for heart disease, diabetes and pulmonary disease has given Glasgow's local health services unparalleled experience in dealing with these issues and access to large numbers of patients. These companies range from major international companies, such as Minerva Medical (part of Quintiles) and Inveresk, to niche companies focusing on specific classes of oncology or cardiovascular targets.

Governmental support

The Scottish Executive, the government for Scotland, regards science (life-science in

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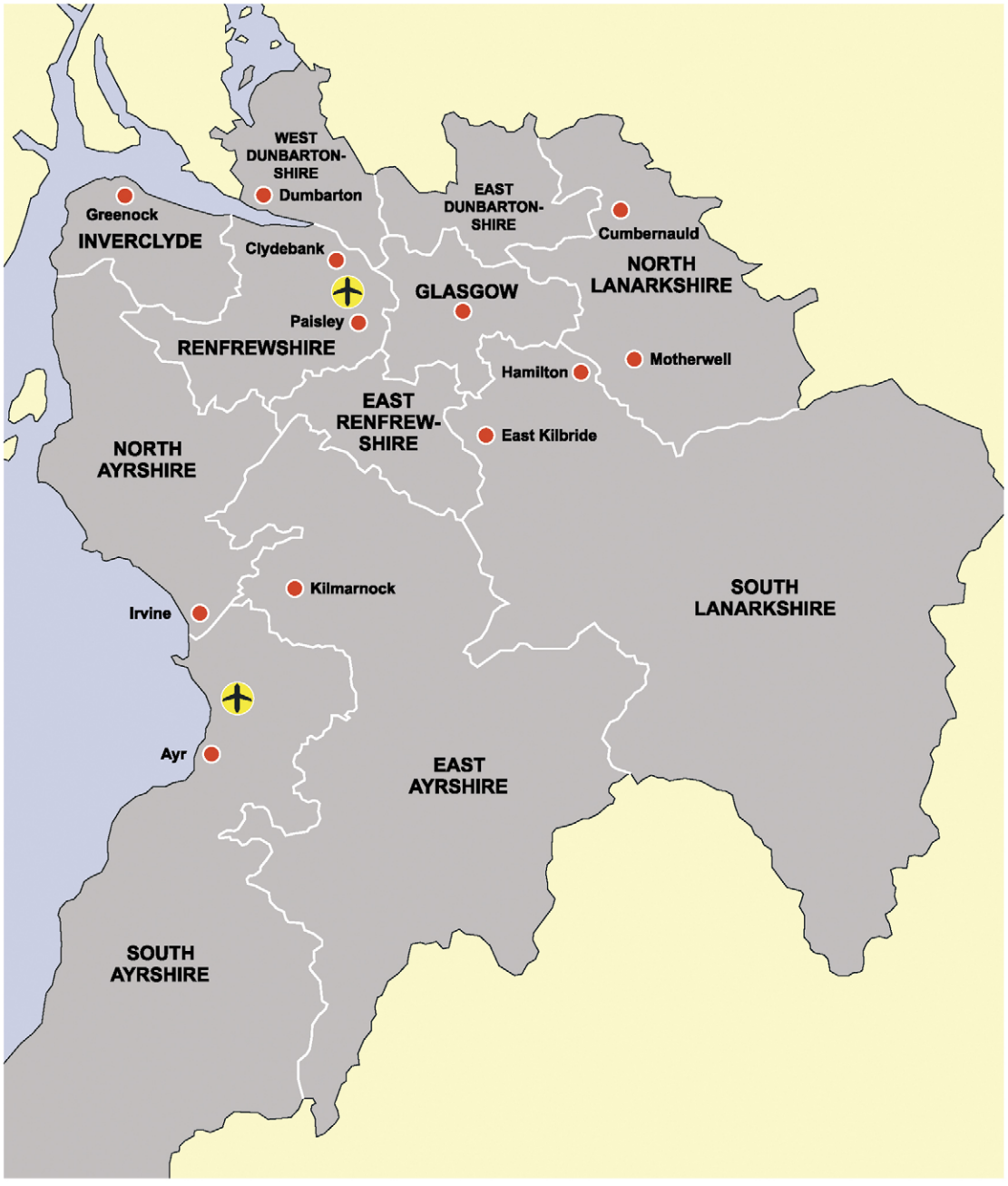

FIGURE 1

Map of the Glasgow and West of Scotland region. Reproduced, with permission, from Nexxus Scotland.

particular) a key area for development. In 2005, the Scottish Executive was set to spend >£270 million on science – much of this directly funding research. The strategy for development of the life-science sector is coordinated at a national level to avoid duplication across the regions of Scotland but the implementation and delivery is in the hands of local groups with detailed knowledge of their region's needs and strengths. David Currie from Scottish Enterprise Glasgow explained to me how help and assistance are available to start-ups in a variety of forms – ranging from incubators to specialized help from such initiatives as Intermediary Technology Initiatives (ITIs) and the Life Science Business Advisory Service (LSBAS). ITIs are part of a £450 million initiative that tries to link up various stakeholders (universities, companies and investors) to encourage technology development and take-up. LSBAS is a panel of highly experienced entrepreneurial scientists with start-up and investment experience who are available to companies for guidance, and to mentor their passage through the processes of starting up and raising finance.

The city of Glasgow is just over half way through its five-year, £185 million investment in life-science research infrastructure. The £12 million British Heart Foundation Cardiovascular Research Centre, directed by Professor Anna Dominiczak, and the £19 million Glasgow Biomedical Research Centre, directed by Professor

FIGURE 2

Map of the main concentrations of life-science activity currently in the West of Scotland. Reproduced, with permission, from Nexxus Scotland.

Eddy Liew, will both be officially opened in 2006. The world-renowned Beatson Institute for Cancer Research, directed by Professor Karen Vousden, will be doubling in size thanks to the addition of a £22.5 million new building. The National Health Service is investing heavily in new clinical research facilities across Glasgow, including the £100 million Beatson Oncology Centre, which is due to open in 2007.

The saying that biotech is a contact sport is as true in Scotland as it is anywhere else. Nexxus is the West of Scotland's BioScience Network. Kate Rowley, of Nexxus Scotland, told me that they work to bring all of the potential partners (academics, investors and public bodies) together on a regular basis to facilitate the interactions that will lead to investments in the region. The excellent quality of life and cultural, social and entertainment environment offered by the city of Glasgow all make it an attractive place to live as well [1].

Science parks and incubators

There are three main concentrations of life-science activity currently in the West of Scotland (Figure 2). Many of Glasgow's biotech companies are situated at the West of Scotland Science Park, a mature site, boasting a crèche, a sports centre, a restaurant and conference facilities. Many more are located in the Medi-Park, within Strathclyde Business Park. Two new technology parks will become available in 2006 to accommodate more companies. City Science is adjacent to the University of Strathclyde in the heart of the City and Nova Technology Park is a five minutes drive from Glasgow, on the M80. All universities in the area have incubators to nurture their spinout companies.

Company case studies

Details of typical examples of companies in the region are given in Box 1, but it is worth looking at a couple in more detail.

Scottish Biomedical is a preclinical drug discovery services company focusing exclusively on early-stage drug research. They couple their expertise in cell systems biology with medicinal chemistry to enable them to establish many successful drug discovery collaborations with pharmaceutical and biotech clients. In addition to capabilities and expertise in ethical human tissue acquisition, molecular biology and protein technology, strengths also include primary and secondary assay development, high-throughput and high-content screening medicinal chemistry and pharmacology (www.scottish-biomedical.com).

One bioproduct company that has recently attracted some attention is Crusade Laboratories. Crusade Laboratories focused on the application of viruses for the treatment of cancer and has made significant advances into the disease. Their modified herpes simplex virus, HSV1716, is currently undergoing Europe-wide Phase III clinical trials in patients with the incurable brain tumour glioblastoma multiforme (GBM). Ultimately, it is hoped that HSV1716 could become a realistic alternative to, or be used in combination with, chemotherapy and/or radiotherapy in patients suffering from a range of cancers (www.crusadelabs.co.uk).

Investment climate

Scotland has not escaped the current downturn in investment in biotechnology enterprises. However, local business angels have stepped forward to fill the gap in providing seeding and start-up finance for several ventures. The Perth-based Braveheart Ventures provided the finance required to set several young companies on their way.

BOX 1

Examples of companies in the West of Scotland

Biopta
Recently emerged from Glasgow Caledonian University, Biopta specializes in the use of isolated human tissue for drug discovery and development, with particular emphasis on cardiovascular and hepatic tissue for analysis of drug safety, as well as predictors of efficacy in the target organs.

Controlled Therapeutics (Scotland)
Controlled Therapeutics is an established drug delivery company that specializes in vaginal and buccal delivery – using its proprietary hydrogel technology for controlled release of a range of drug molecules over periods of 24 h. The company already has one successful product for labour induction on the market, marketed as Cervidil®, and has several others in development, including vaginal ring polymers and biodegradable polymers for delivery of biological molecules (www.ctscotland.com).

Drug Discovery Limited
Drug Discovery Limited (DDL) provides the pharmaceutical industry with ready access to an enormous chemical diversity from which novel therapeutics are developed. DDL possess the world's largest and most-diverse library of plant extracts, specifically produced for drug discovery in the world, representing >90% of the world's families of higher plants. DDL concentrate on the commercial development of the natural-product-based activities at the Strathclyde Institute for Drug Research (SIDR) (www.drugdiscovery.co.uk).

Invitrogen
Invitrogen, headquartered in Carlsbad California, employs 500 in three sites across the West of Scotland, including BioReliance, which was acquired by Invitrogen in 2004. Invitrogen provides essential technologies to biotechnology and biopharmaceutical researchers and companies worldwide (www.invitrogen.com).

Link Technologies
Link Technologies was established in the West of Scotland in 1990 and has since built up a global reputation as a supplier of complex molecules used in the synthesis of DNA and RNA. Initially set up by graduates of the University of Glasgow within the university's business-incubator facilities, the company's 15 employees now work from purpose-built facilities within Strathclyde Medi-Park (www.linktech.co.uk).

MD Biosciences
MD Biosciences (MDB) is a recent spin out of Glasgow University that has assembled a specialized range of products and services to facilitate drug discovery for inflammatory diseases including rheumatoid arthritis and multiple sclerosis. The in-depth expertise in these disease models has been applied to designing protocols to assess the efficacy and required dosage of novel compounds (www.mdbiosciences.com).

XstalBio
XstalBio is a start-up company with a new platform technology for coating biomolecules onto water-soluble microcrystals. The company strategy is to leverage the proprietary CLAMS technology for making protein-coated microcrystals, building a drug delivery company specializing in advanced biomolecule formulations (www.xstalbio.com/home/page).

BOX 2

Other useful contacts

General information about the biopharm and biotech sector in the West of Scotland:
www.nexxusscotland.com
www.scottish-enterprise.com/glasgow

Braveheart Venture Capitalists:
www.braveheart-ventures.co.uk

Conclusions

The academic base and the growing interest of government and business partners in fostering and developing its commercial potential suggest that Glasgow and the West of Scotland could soon witness an unparalleled period of growth in the biotechnology sector (see Box 2 for contacts and other information of agencies and stakeholders). Scottish Enterprise has addressed the perceived limitations, such as lack of local pharmaceutical research facilities, by reaching out and finding collaborators across the globe. It is this keen sense of local advantages and global vision that gives the impression that Scottish biotechnology is set to prosper.

Reference

1 Leibovitz, J. (2004) 'Embryonic' knowledge-based clusters and cities: the case of biotechnology in Scotland. *Urban Studies* 41, 1133–1155

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