Article

# Investment in Life Sciences in Scotland: Challenges and Opportunities

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joined Scottish Enterprise's Life Science Industry team in May 2008. Prior to this, Andrew was Programme Leader for Scottish Enterprise's flagship Life Science project - the Edinburgh BioQuarter. In over 10 years at SE, he has been responsible for developing the Scottish Centre for Regenerative Medicine and the development of a national strategy for stem cell development with Scottish Enterprise, Scottish Government and industry stakeholders. Andrew is currently a director of Roslin Cells Ltd, and formerly a founder and Director of the Scottish Stem Cell Network; and a former Director of Scottish Health Innovations Ltd – which works in partnership with NHS Scotland to protect and develop new innovations which come from NHS Scotland's Health professionals. Prior to SE, Andrew spent over 10 years working for high-profile Scottish medical device startups, including Optos and Voxar (now Toshiba Medical Visualisation Systems), in a variety of engineering, product development, marketing and management roles – working with some of the world's biggest medical companies including GE and Toshiba. Andrew has a Bachelor of Engineering degree in electronics & software engineering from Edinburgh's Heriot-Watt University, and an MBA from the University of Edinburgh's Business School.

## ABSTRACT

As the global life sciences industry changes, the most successful regions in attracting inward investment will be those that evolve and adapt to provide the most attractive offer. In Scotland, the government is developing an environment to "push" its life sciences sector to complement the strong "pull" that these changes in the global life sciences industry and in investor sentiment have created.

The Scottish Government and the life sciences industry have developed a strategy that aims to anchor in Scotland those businesses that provide vital skills and market access; increase the number of more resilient companies and comprehensive supply chains; and attract new inward investment and talent that will build on Scotland's existing capabilities.

The Scottish Government is improving on the country's existing strengths and aims to capitalise on prior investment in Scotland's research excellence, particularly in areas such as stem cells and regenerative medicine and "precision medicine", where there are significant current and emerging commercial opportunities.

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Regions around the world are competing in life sciences investment and trade—you only have to look at the number of regional booths at a BIO convention to see the extent of this competition. However, as the global life sciences industry changes, the most successful regions will be those that evolve and adapt to provide the most attractive offer.

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In Scotland, the government is developing an environment to "push" its life sciences sector to complement the strong "pull" that these changes in the global life sciences industry and in investor sentiment have created.

The Scottish Government is building on its strong heritage in life sciences to create an environment where the new breed of Scottish life sciences companies can thrive. The life sciences industry in Scotland worked closely with the government to develop a strategy both to double turnover within the sector to £6.2 billion and to double the sector's annual contribution to the Scottish economy from £1.5 billion to £3 billion Gross Value-Added by 2020.

**Table 1:** Turnover, employment and company number for Scotland in 2012

| | Turnover (£m) | % | Enterprises | % | Employment (thousands) | % |
|---|---|---|---|---|---|---|
| **Agritech** | 393.4 | 12.0 | 33 | 6.4 | 1.4 | 6 |
| **Connected health** | 13.9 | 0.4 | 16 | 3.1 | 0.2 | 1 |
| **MedTech** | 1,053.3 | 32.0 | 243 | 47.1 | 8.5 | 38 |
| **Pharmaceuticals** | 656.3 | 20.0 | 29 | 5.6 | 3.3 | 15 |
| **Pharma services and contract research** | 634.3 | 19.3 | 86 | 16.7 | 4.7 | 21 |
| **Professional services** | 157.3 | 4.8 | 58.0 | 11.2 | 1.7 | 7.5 |
| **Therapeutics** | 13.7 | 0.4 | 10 | 1.9 | 0.2 | 1 |
| **Other Sector** | 365.6 | 11.1 | 42 | 8.1 | 2.6 | 12 |

*Source:* Scottish *Government 2012*

The key strands to this strategy aim to anchor in Scotland those businesses that provide vital skills and market access; increase the number of more resilient companies and comprehensive supply chains; and attract new inward investment and talent that will build on Scotland's existing capabilities. Not only is the Scottish Government improving on the country's existing strengths, in areas such as medical technologies and pharma services where there is already a substantial company base, ranging from innovative start-ups to global multinationals, but also it aims to capitalise on prior investment in Scotland's research excellence, particularly in areas such as stem cells and regenerative medicine and "precision medicine", where there are significant current and emerging commercial opportunities.

Scotland's dynamic and progressive life sciences sector, widely recognised as a leader in Europe, is home to more than 600 organisations, employing over 30,000 staff in total. Life sciences companies in Scotland have an annual turnover of around £3.3 billion (2012) and have shown a 4.2 per cent compound annual growth in turnover from 1998 to 2011.

Changes in the international business environment present a number of opportunities for the global life sciences industry. The most significant of these comes as big pharma companies struggle to maintain their product pipelines. As they seek to meet the increasing demands of shareholders to maintain growth margins, more and more pharma companies are looking to partner with, license from or acquire smaller life sciences companies. The last twelve months has been one of the busiest ever for pharmaceutical deal making. More and more pharma companies are looking at ever-earlier stage assets and paying ever-higher prices for those assets.

Pharma companies have also looked at other ways to change their business models. There is greater focus on specific disease areas, with non-core assets being sold, exchanged or spun-off. There is a greater reliance on outsourcing from early stage development, through to formulation and manufacturing. There is also a move to locating new facilities, or moving facilities, closer to academic and clinical centres of excellence.

Scotland's life sciences sector is well positioned to benefit from these changes: there are companies developing innovative new drug candidates; there is a healthy pharmaceuticals services segment offering a full range of outsourced capabilities; there are world-renowned academic research and clinical development institutions, which are all closely connected.

Another opportunity comes from changes in investor appetites and new sources of capital which are altering the landscape for investment in the life sciences sector. But, life sciences companies across the globe continue to face a number of challenges. The Scottish Government has introduced a number of measures to address these challenges, complemented by those introduced at a United Kingdom (UK) level, but of course there is still more to do.

Access to capital is the most significant challenge facing life sciences companies at all stages of development, regardless of location. Life sciences companies need to ensure they have sufficient funding to fully support product development, company growth and international expansion. Scotland is home to deep pools of capital and a broad range of potential investors at all stages of the life sciences lifecycle.

Angel investment is a crucial source of capital for the earliest stage companies and Scotland has active angel investors and venture capital funds dedicated to life sciences. In fact, Scotland has more business angel investment per head of population than any other country in Europe. The angel investor network in Scotland is currently active with 30 different syndicates investing in life sciences.

**Table 2:** Equity investments in Scotland (2014)

| Company | Amount (000's) |
|---|---|
| Bedi Oralcare | £100 |
| Blackford Analysis | £800 |
| Calvicis | £1,300 |
| Cardio Precision | £858 |
| Curapel | £200 |
| Cytomos | £100 |
| DestiNA Genomics | €1,200 |
| Edinburgh Molecular Imaging | £4,000 |
| Epipole | £400 |
| Eye2i Diagnostics | £520 |
| Glycomar | £890 |
| Jellagen Pyt | £550 |
| MGB BioPharma | £2,700 |
| NeurocentRx Pharma | n/d |
| Nucana | $57,000 |
| Ocutec | £500 |
| ProFactor Pharma | £300 |
| Ryboquin | £220 |
| Sirakoss | £25 |
| Sirakoss | £4,040 |
| UWI Technology | £1,268 |
| Viopti | £218 |

*Source: Young Company Finance and Scottish Enterprise 2014*

One of the most notable of these syndicates is Archangels. Archangels was established in 1992 specifically to invest £25,000 in Optos, which was founded by Douglas Anderson after his then five-year-old son went blind in one eye when a retinal detachment was detected too late. The company set out to commercialise a patient-friendly retinal image product that encompassed a digital wide-field image of the retina in a single capture. The company's retinal image scanner was commercially launched in 2000. In 2006, Scottish Enterprise-supported Optos floated on the London stock Exchange for £165 million and in February this year was acquired by Nikon for £259 million.

Since that initial investment, Archangels' syndicate members have invested in excess of £55 million into some 60 early stage companies, primarily in the life sciences and technology sectors. In 2014 Archangels arranged funding of £12.2 million for 14 companies, comprising £7.5 million of investment from Archangels' investors, with a further £3.5 million of co-investment from Scottish Enterprise and £1.2 million from other partners. The biggest investment in 2014 was £2.5 million in Scottish bionic prosthetic upper limb producer, Touch Bionics. Touch Bionics is the first spin-out from Scottish Health Innovations Ltd, which was established by Scottish Enterprise and National Health Service (NHS) Scotland to commercialise innovation developed by healthcare professionals.

The Scottish Investment Bank (SIB), which is the investment arm of Scotland's economic development agency, Scottish Enterprise, manages a suite of funds, through which it co-invests alongside angel networks, such as Archangels, and other investors. The Scottish Investment Bank's investments range from seed deals of £20,000 - £250,000 through co-investments of £100,000 - £1 million to venture deals of £500,000 - £2 million for small- and medium-sized enterprises at development and expansion stages. In the past five years SIB has invested more than £40 million in life sciences companies, leveraging £90 million in private investment.

Once companies grow past angel-level investment they usually need access to venture capital. However, the life sciences venture capital environment has changed over the last few years. First, venture capital fund managers are becoming more risk adverse and the proportion of venture capital invested in later stage companies has increased.

Second, there has been a move in life sciences venture capital to project-focussed, or asset-centric, funds such as those managed by Index Ventures or Atlas Venture. These funds focus on taking a particular project to a specific point where they plan to exit.

Third, there are few venture capital funds actively looking to invest in life sciences, although to some extent this has been offset by the rise in corporate venture capital such as GlaxoSmithKline's SR One, Johnson & Johnson's Development Corporation and Novartis Ventures. GlaxoSmithKline and Johnson & Johnson also invested in Index Ventures' asset-centric €150 million Life Sciences Fund.

Although the environment for venture capital in life sciences has changed, it remains a significant source of potential investment. With the opening of the IPO

**Table 3:** Examples of inward and equity investment 2014, Young Company Finance and Scottish Enterprise

| Company | Investment | Description |
|---|---|---|
| Aptuit | $1 million | To invest in its facility in Glasgow, to expand its capacity to manufacture sterile cytotoxic liquid and lyophilised drug products. |
| BioOutsource | n/d | New Biosimilar Centre of Excellence in Glasgow announced by a global leader in biologics contract testing and biosimilar characterisation |
| DestiNA Genomics | €1.2 Million | To commercialise novel tests for cancer and infectious diseases |
| Edinburgh Molecular Imaging | £4 million | Funding round was led by Epidarex Capital for a start-up company, based at Edinburgh BioQuarter working on diagnosis of lung diseases |
| MGB Biopharma | £4.0 million | To advance its novel lead antibacterial, MGB-BP-3, into Clinical Development |
| Nucana | $57 million | Series B financing raised to fund expansion of clinical studies with its anti-cancer ProTides |
| Roslin Cells | €3million | Innovative Medicine Initiative money won to manage the "European Bank for induced pluripotent Stem Cells" (EBiSC). |
| Sirakoss | £3.1 million | Series-A financing from a syndicate of investors led by Epidarex Capital and including SIB. |
| TC BioPharm | n/d | Investment by MEDINET, a Tokyo-listed immuno-cell therapy company, and MEDINET will exclusively license its innovative cell therapy technology to TC Biopharm for clinical development in the UK and Europe. |
| UWI Technology | £1.2 million | For testing and commercializing smart label products |

window and the rise in value of life sciences share prices, successful fund managers have been able to raise additional funds.

There have also been some new funds which are investing across the UK. The Wellcome Trust established Syncona Partners with a £200 million fund which aims to identify, support and develop technologies with the potential to significantly impact the healthcare market of the future with a long-term investment horizon. Cancer Research Technology and the European Investment Fund create the £50 million Cancer Research Technology Pioneer Fund to bridge the investment gap between cancer drug discovery and early development. In Scotland, the Scottish Investment Bank is one of the investors in Epidarex capital's $47.5 million fund, alongside Eli Lilly, King's College London, the European Investment Fund and Strathclyde Pension Fund. The fund is dedicated to investment in promising life sciences start-up companies in the UK.

Despite the availability of additional venture capital opportunities, Scottish Enterprise is not seeing enough Scottish companies seeking to attract venture funding, which they could be doing from day one. The organisation is working with companies to address this by helping companies understand that they are in a global competition for finance and they need to change their level of ambition, something that has worked well for internationally ambitious and successful Scottish companies in other sectors.

There has also been an increased level of investment in life sciences beyond venture capital. While he was at Invesco, Neil Woodford built a reputation on long-term investments, with investments in life sciences companies, both public and private, as well as in technology transfer organisations taking a significant proportion of his portfolio. Last year, Woodford established his own fund, the Woodford Equity Income Fund in which healthcare stocks are about one-third of his investments. This year he launched the Woodford Patient Capital Trust, which invests in early- and growth-stage, IP-focussed businesses, such as those in life sciences, with the aim of helping them fulfil their growth potential. Woodford believes that despite having some of the best universities and finest intellectual property, the UK has a poor record of converting this into commercial successes. He attributes this primarily to a lack of appropriate capital investment and thinks that a long-term 'patient capital' approach can deliver extremely successful outcomes and help businesses fulfil their potential, while also helping to develop the UK's 'knowledge economy'. Initially, Woodford's plan was to raise £200 million for the fund but in April the fund closed at £800 million.

The combination of these new funds with venture capital, angel syndicates, government support and grant funding from the UK Research Councils and European Union established a funding platform to help companies in Scotland bring new innovations to market and to grow into globally competitive businesses. However, the challenges of the past have meant that there have only been a small number of successes. One of the entrepreneurs behind the growth of Bioenvision from a start-up to a global, NASDAQ-listed biopharmaceutical company and to its eventual acquisition for $345 milion by Genzyme, Hugh Griffith, is now chief executive officer (CEO) at Nucana Biomed and CEO of Alida Capital International, a specialist biopharmaceutical business angel syndicate. Last year Nucana Biomed closed a £33.85 million series B financing to fund the development and commercialisation of its portfolio of anti-cancer medicines. This investment is the largest ever biotechnology investment in Scotland. Another example is Collagen Solutions plc, the company formed by the reverse merger of CollBio into Collagen Solutions LLC and led by Stewart White, which listed on the London AIM market to drive financing for growth and acquisition.

The main source of Scotland's innovative new companies is its universities, which are globally recognised. Four of the world's top 100 universities for life sciences are in Scotland: Aberdeen, Dundee, Edinburgh and Glasgow; and two of the top 100 for health are located in Edinburgh and Glasgow.[1]

These universities are at the heart of Scotland's world-class research base, which has a reputation for pioneering medical advances. Scotland ranks among the top three contenders worldwide for average productivity and impact of its life sciences researchers.[2] Scotland's universities attract 15 per cent of UK academic biosciences research funding,[3] with life sciences accounting for 55 per cent of total Scottish university research funding.[4]

Scottish universities are also successfully spinning out new companies and Edinburgh and Strathclyde Universities are ranked fourth and fifth in the UK for spin-out creation.[5] This is testament to the excellence of Scottish research institutions and their collaborative partnerships with leading companies worldwide. In the UK, Scotland has emerged as one of the leading locations for life sciences start-up companies as public sector support for start-ups has held up more strongly in Scotland than the rest of the UK. The number of university spin-outs in Scotland has increased while the number that didn't emanate from a university decreased.

Another significant challenge for companies in Scotland, and the UK as a whole, has been the commercialisation of innovative products developed by the science base. To help companies better succeed at commercialisation, Scottish Enterprise partnered with the University of Edinburgh and NHS Lothian to develop the world renowned Edinburgh BioQuarter, a £600 million ($1 billion) centre for biomedical commercialisation, which aims to help companies at all stages of their development. Edinburgh BioQuarter is Europe's fastest-growing academic medical centre and brings together scientists with commercial research companies to accelerate the development of new drugs, diagnostic tools and medical devices to treat diseases. The centre has three aims: first to foster deeper links between academia, the NHS and industry through collaborative research, second to create new companies based on Edinburgh's research base and third to encourage a culture of commercialisation in the NHS and among academic researchers.

The team at BioQuarter has helped spin out eight companies in the last two years. These include i2eye Diagnostics Ltd, a company that has created the world's first visual field analyser for children and vulnerable patient groups, and Aquila BioMedical, a specialist Contract Research Organisation focused on immunology and neuroscience. The team is also developing a pipeline of projects at the facility, which it hopes to launch as the next-generation of new companies in the near future, which will provide additional jobs and contribute to the economy.

The Scottish Centre for Regenerative Medicine is also located at Edinburgh BioQuarter. The centre brings together 250 scientists, including biologists and clinical academics from the Medical Research Council (MRC) Centre for Regenerative Medicine and applied scientists working with the Scottish National Blood Transfusion Service and Roslin Cells. BioQuarter is also a pioneering centre for data science and is a key base of the Farr Health Institute in Scotland. The Institute aims to harness health data for patient and public benefit by setting the international standard for the safe and secure use of

1 https://www.timeshighereducation.co.uk/world-university-rankings/2015/world-ranking#/sort/0/direction/asc
2 International Comparative Performance of the Scottish Performance in Life sciences Elsevier, 2013
3 The economic impact of Scottish universities, Appendix 2, Scottish Enterprise 2012 (from Universities Scotland)
4 HESA data for 2011-2012 (based on SE's definition of LS and HESA Research Grants and Contracts category which excludes SFC funding)
5 PraxisUnico Spinouts UK Survey Annual Report, 2012

electronic patient records and other population-based datasets for research purposes.

As well as this, BioQuarter includes a company incubator unit which can host start-ups generated from the facility's innovations and companies coming to collaborate with research organisations there and in Scotland.

The final significant challenge facing life science companies in Scotland is they are often only raising small levels of funding as their investors are often only based in Scotland. Scottish Enterprise recognises that there is an upside to this as it presents companies with an opportunity to reach out to the wider potential international investor base outside the country. This is what Nucana did when it raised its Series A and B rounds, bringing international investors including Sofinnova and Morningside into their syndicate alongside their angel investors and the Scottish Investment Bank. Nucana's $57 million Series B round in 2014 was the largest ever raised in Europe and companies need both ambition and to reach beyond Scotland's borders.

In order to support companies seeking investment from overseas, Scottish Enterprise has tailored its services and advice to companies and is focused on creating "investable" companies with ambitious, capable management teams who have a good understanding of investor requirements. Scottish Enterprise works with life sciences companies in four areas: helping the company to build a much more comprehensive overview of their short-, medium and long-term requirements; actively building relationships with relevant venture funds; organising regular company/investor meetings; and building relationships with networks of corporate financial advisors, particularly in London. An early success for this programme was the commercial partnership between Synpromics and Dow. Scottish Enterprise made the initial introductions by matching Dow's requirements with the most fitting young companies, which allowed Synpromics to showcase its technology and secure the opportunity.

The three main challenges facing Scotland's life sciences sector: funding, commercialisation and international profile will be familiar to companies across the globe. However, one of the reasons why Scotland is widely recognised as one of the world's leading locations for life sciences is because of how it has addressed these challenges and created opportunities for companies.

Scotland has a dynamic and progressive life sciences sector; it has a government committed to doubling the sector's contribution to the economy by 2020; it has world-leading research universities spinning out new start-up companies; it provides businesses with access to government grant funding schemes, active angel investors and venture capital funds dedicated to life sciences; it has globally renowned research centres and business development facilities. Many other countries claim to offer similar support for life sciences, but Scotland has all the pieces of the life sciences jigsaw, and, most importantly, in Scotland all of those pieces fit together to offer a unique opportunity for the life sciences sector.