

Biotech Focus Editors: Jayne Carey and Ulrike Knies-Bamforth
ddt@elsevier.com

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Shining Nordic lights: Swedish science parks drive international biotech research

Ylva Williams, ylva.williams@isa.se

Sweden is home to three of the world's most active centres of life science research and development, at the Ideon, Medeon and Karolinska science parks. These science parks – and the vibrant communities that have grown up around them – are the source of many of the world's groundbreaking biotechnology and pharmaceutical developments (see [Box 1](#)). What lies behind this success, and how are international biotech and pharmaceutical companies able to take advantage of this concentration of expertise?

Sweden has earned an international reputation as a global leader in biotechnology

and pharmaceutical R&D. The country's culture of innovation has led to discovery of some of the world's most successful drugs, medical devices and technology. One of the world's first biotech drugs (Genotropin, the recombinant growth hormone) started development in Sweden as far back as the 1970s. The country is renowned for its ability to apply research progress in clinical practice, and for the successful collaboration between the public and private sector. The population is extremely well documented in terms of medical history – Sweden's Karolinska Institute has the world's most extensive registry of twins, for example – and is keen to participate in clinical trials.

These factors have stimulated the development of a large number of drugs and related innovations with, crucially, rapid and efficient progress through preclinical and clinical development phases to commercialization. Sweden is well positioned for continued discoveries, especially given its advanced public healthcare system, which is open to trying new treatments and technologies. It is renowned for its ability to apply research progress in clinical practice, stimulating the development of a large number of drugs and innovations. At an early stage, the country began building an advanced, centralized healthcare system, which has fostered the establishment of highly reliable systems of medical records with common processes and methods to ensure quality. Particular areas of expertise include diabetes,

cancer, central nervous system disorders, cardiovascular and respiratory diseases, and immunology and inflammation. In addition, Sweden is leading the way in stem cell research.

One of the key factors behind this success has been the role of Sweden's science parks in stimulating and nurturing biomedical innovation.

Bridging the sound barrier

With their strong focus on biotechnology research and development, the Ideon and Medeon Science Parks in the south-west of Sweden have been major contributors to the region's growing reputation as a centre of biomedical research. They form part of the flourishing 'Medicon Valley' – home to more than half of Scandinavia's medical industry and one of the world's greatest concentrations of biotech and pharmaceutical companies – which encompasses both sides of the Öresund sound (greater Copenhagen in Denmark and the Skåne region of Sweden).

Sweden got the ball rolling with the founding of Scandinavia's first science park, Ideon, in 1983, just outside the university town of Lund in the south-west of Sweden. Today, Ideon is still Scandinavia's largest science park. It is home to over 200 companies, and has helped some 300 others on their way to success in the outside world. Altogether, Ideon has been responsible for creating 5,000 jobs in an area of Sweden that had suffered from the loss of shipbuilding and other traditional industry.

From its origins as a way to boost Swedish employment in the area, Ideon has grown to become a truly international centre, as Hans Möller, Ideon CEO, confirms. 'Last year alone, four major international companies moved

BOX 1

Biotechnology in Sweden

Science Parks

Karolinska Science Park;
www.ki.se/sciencepark/about/
Medeon; www.medeon.se
Ideon; www.ideon.se

Institutes

Karolinska Institute; www.ki.se

Companies

Karolinska Innovations;
www.karolinskainnovations.ki.se/
Karolinska Development;
www.karolinskadevelopment.ki.se/
Bioinvent; www.bioinvent.se
Probi; www.probi.com
Acadia Pharmaceuticals;
www.acadia-pharm.com/
Galenica; www.galenica.se

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into Ileon, and it looks as though this trend will continue in 2005 as this area's reputation grows.'

Among the companies at Ileon is BioInvent, which has created a library of more than 20 million human antibodies that can be used in the creation of new drugs that can tackle diseases with unprecedented precision. One example of this is a potential treatment for atherosclerosis (the formation of fatty plaques in medium and large arteries) through the use of antibodies to LDL (low-density lipoprotein, which carries 'bad' cholesterol in the blood).

Another Ileon success story is Probi, a company that conducts research into gastrointestinal disorders, cardiovascular disease risk factors, immunology, and stress and performance recovery in order to develop bacterial strains for probiotic products for clinical nutrition, functional foods and dietary supplements.

'Little sister' comes of age

In Malmö, Medeon Science Park is also making a name for itself on the world bioscience stage. For Medeon – often viewed as Ileon's 'little sister' – expansion is the name of the game. As Medeon's CEO Charlotte Ahlgren puts it, 'For nearly 20 years we have operated in the shadow of Ileon. Now we are strengthening our profile to draw international companies to Medeon.'

In December 2004, the Medeon Science Park opened a new 'Greenhouse', purpose-built both as an incubator for start-up companies and to enable established firms to gain a market foothold in Scandinavia.

Medeon's growth ambitions received a significant boost last year when international biopharma company ACADIA Pharmaceuticals

decided to establish a new chemistry R&D operation at the park and to move some of its existing operations from Denmark to Sweden. A custom-built 3,000 square-metre chemistry laboratory and office building is under construction and due for completion in mid-2005, when it will accommodate around 50 ACADIA researchers. ACADIA plans to use this new facility to build on its drug discovery and clinical development activities for novel treatments of central nervous system disorders, such as Parkinson's, schizophrenia, chronic pain and glaucoma.

Another Medeon company that is growing is Galenica AB. Originally a two-man band, Galenica now employs 25 people and has just moved into new offices at Medeon, where it provides pharmaceutical consultancy in the development of new formulations of pharmaceuticals and nutraceuticals, as well as herbs and herbal extracts. Clients include Ferring and Pharmacia.

Capital growth

Sweden's capital Stockholm is home to the world-renowned Karolinska Institute, which in 2002 established the Karolinska Science Park to commercialize its research, and strengthen competitiveness and knowledge exchange for its researchers.

Growth is very much the order of the day here too. The Karolinska Science Park has ambitious expansion plans and is about to lay the foundations of three new state-of-the-art buildings. These will offer purpose-designed, flexible laboratory and office space to both start-ups and established life science companies.

There is a strong focus in commercialization at the Karolinska Science Park. This is highlighted by the formation of Karolinska Innovations AB, a company dedicated to getting start-ups off the ground.

'Since Karolinska Innovations has been running, we've evaluated some 550 new projects, and roughly one-tenth of these have been accepted,' says Folke Meijer CEO of Karolinska Institutet Holding AB, responsible for the running of the Karolinska Science Park. 'Of these, about 30 companies have been founded and 20 licenses have been sold.'

In 2004, a company called Karolinska Development was set up as an investment



vehicle for its innovative companies. The fund raised more than SEK100 million (>£8 million) in 2004.

One of the recent successes at the Karolinska Science Park is InDex Pharmaceuticals, which develops RNA blocking drugs for the treatment of inflammatory diseases and cancer. Chronic inflammation includes a range of diseases such as rheumatoid arthritis, asthma, psoriasis and inflammatory bowel disease (IBD), such as Crohn's disease. One of the company's drugs for the treatment of IBD has already entered phase two clinical trials on patients suffering from active ulcerative colitis, in conjunction with international biotech company Serono.

Shared knowledge, shared success

One of the biggest benefits that places like Ileon, Medeon and the Karolinska science parks offer is the opportunity for networking.

Ahlgren sees encouraging interaction between individuals and companies as a key objective. 'Our recently established Greenhouse doesn't just provide low-cost office space and support services. It's also a great environment for start-up companies to build links with companies operating in complementary fields and with the world beyond through Malmö Hospital and the university, for example.'

'We often find that, while our start-up companies have great product knowledge,



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they often need support in areas such as sales and marketing,' Ahlgren continues. 'They also benefit greatly from the opportunity for more informal knowledge transfer. We've established the Medeon Healthcare Network, which has 300 member individuals and companies, precisely to encourage this kind of exchange of ideas, advice and support. Through it, we organize seminars, workshops, study visits and breakfast events with guest speakers on topics ranging from Intellectual Property Rights through recruitment to team-building.'

Hans Möller at Ideon agrees with this approach. 'Networking and matchmaking, in particular, are vital aspects of our work. Good ideas can come from the universities, from industry or from a combination of the two. But the best way to bring them to fruition is through a combination of R&D and commercial people.'

'Even though our start-up companies are typically very small, they need to think big and get themselves noticed on the international stage,' continues Möller. 'We encourage them to do that through participation in things like overseas exhibitions and conferences.'

Collaboration and knowledge transfer are also seen as vital at the Karolinska Science Park. As Meijer puts it, 'To me it is imperative that biomedical discoveries can be made to benefit society as soon as possible. Having a nice research report in the library is not the end of the process. We want to ensure that advances make it into the outside world, with high quality delivered at every stage.'

The Karolinska Science Park maintains strong links with the Karolinska Hospital, Stockholm University, and the Royal Institute of Technology as well as with several other leading hospitals around Sweden and other Nordic countries. It has also set up Karolinska Education to offer specialist external training – for senior managers in biomedical companies, for example.

So how do Sweden's biotech science parks see the future? Möller sees a continuing trend towards more international collaboration. 'This has long been a global industry, but we are seeing expertise in certain aspects of drug discovery becoming much more concentrated geographically. I believe Sweden's science parks are well placed to help international



companies progress their drug discoveries, particularly in biotechnology.'

Folke Meijer also predicts a bright future for biotech R&D in Sweden. 'In an increasingly global industry, we are very lucky to have the Karolinska brand name. International companies will have an even greater biotech R&D resource available to them in Sweden as we expand our facilities this year through the Stockholm Bioscience project.'

At Medeon, Charlotte Ahlgren sees a strong future for 'lifestyle' sciences as a complement to drug discovery. 'We would like to establish a lifestyle centre that brings together a number of companies in the fields of functional foods, diet and stress management. The idea is to provide scientifically researched complements to primary healthcare, for example, in areas such as diabetes – one of today's most common, and growing, lifestyle-related diseases.'

With their focus on some of the world's most pressing unmet medical needs, Sweden's science parks look set to be at the leading edge of drug discovery over the coming years.

Ylva Williams,
Invest in Sweden Agency,
World Trade Center,
Klarabergsviadukten 70 B6,
P O Box 90,
SE-101 21 Stockholm, Sweden

Pictures courtesy of Lasse Davidsson and Tomas Utsi