



National and regional cluster profiles

Companies in biotechnology, pharmaceuticals and medical technology in Sweden

2007



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National and regional cluster profiles

Companies in biotechnology, pharmaceuticals and medical technology
in Sweden 2007

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VINNOVA

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Biotech Umeå
BioMedley/New Tools for Health Linköping

Initiator



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Preface

In December 2006, VINNOVA was commissioned by the Swedish Government to carry out an international study to shed light on the competitiveness of the Swedish sectorial innovation systems of pharmaceuticals, biotechnology and medical technology in international comparison.

The study includes analyses in three main focus areas in an innovation system perspective:

- The key players in the Swedish innovation system, who they are and their position in an international comparison
- Trends, initiatives and commitments in other countries/regions
- Comparative case studies to investigate the competitiveness of the Swedish innovation system

The main question is What structure, growth and development capacity does the Swedish pharmaceuticals, biotechnology and medical technology industry have compared to other countries/regions excelling in this field?

The project is also co-financed by the Swedish Association of Scientists, Swedish Association of Graduate Engineers, the Swedish Pharmaceutical Association and the Swedish Association of the Pharmaceutical Industry.

The present report is one of the studies carried out as part of the project. The aim is to analyse the structure, dynamics and performance of the life science industry. It is also intended that this study will be followed by a few analyses with the same methodology applied to other countries or regions as part of the benchmarking exercise. The present report does not analyse the implications of the results identified. Such discussion is intended to be conducted in forthcoming studies of the benchmarking project.

The project manager of this commission is Anna Sandström at the Strategy Development Division of VINNOVA and the authors of the report are Anna Sandström and Helena Bergqvist, VINNOVA and Tage Dolk, Addendi AB.

Göran Marklund
Director and Head of the Strategy Development Division
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Abstract

This study reports on approximately 617 companies with 34,400 employees in the life science industry in Sweden involved in manufacturing, consultancy, product development and/or research and development (R&D). It gives a snapshot of these companies' activities in Sweden in 2006, grouped by business segment, type of activity and region. The companies focusing on marketing and sales of life science products are not included in the cluster profile; they correspond to about 210 companies and 7,200 employees. This gives a total of 41,600 persons employed in the industry. The dynamics and economic development since 1997 are also analysed.

The Swedish life science industry is dominated by AstraZeneca, with about 28% of the total number of employees. The industrial structure includes a limited number of medium-sized companies and a large number of small firms. Since the acquisition of Pharmacia Corporation, Pfizer has divested most of the Swedish business segments of the company, with the bioproduction facility in Strängnäs as the only unit expanding its activities.

Analysing the contribution of this industry to the Swedish economy is of great interest in order to assess its importance, but we also include an analysis of employment development in the present study. Over the period 2003-2006, the industry has hardly changed its number of employees. However, whilst R&D-intensive companies, i.e. those categorised under R&D activity in the present study, have expanded, other companies have reduced their number of employees. Between 1997 and 2006, the biotech sector has seen a 5.8% increase. The company population for the pharmaceutical and medical

technology sector is only known for the years 2003-2006. The pharmaceutical sector increased by 1.2% over the period 2003-2006 and the medical technology sector remained practically unchanged over the same period.

The economic development is studied in terms of development of production (net turnover per employee and value added in absolute terms), development of productivity (value added per employee) and development of relative results (results after financial items relative to the net turnover), all in real terms. The results indicate that production has grown significantly over the entire ten-year period, particularly for R&D-intensive companies. The development of relative results shows that there was a peak in 2000, a low point in 2002 and another peak in 2004 for the life science industry. R&D-intensive pharmaceutical and medical technology companies have higher levels of relative results, whereas this is not the case for biotechnology. It is also seen that the estimated average growth rate of the life science industry is higher than for the estimated average growth rate of all industries.

Together, the cluster profiles, employment development and economic development, give insights into the size, structure, development and performance of the Swedish life science industry for 1997-2006. Overall, the 1997-2003 development was strong: production grew significantly, the estimated average growth rate was high and the number of employees increased. However, the 2003-2006 development has been much weaker, especially in terms of employment development.

1. Introduction

Today, life science is considered a critical foundation for long term innovation and growth in many countries' industry and society. The life science industry is an important branch of industry, of economic and political significance to today's Swedish society. Accurate knowledge of the extent, structure and development of this industry is essential for sound policy decisions. Some of the technologies used by the life science industry are also used by such things as the forest, pulp and paper industry as well as the food industry but those companies are not included in the study. Only companies focusing on the included business segments are analysed.

The present study focuses on companies but does not account for other parts of the innovation system, such as the healthcare sector, public authorities, universities or other research organisations which are important players in the life science innovation system.

The overview presents different aspects of the Swedish life science industry and is based on the life science company database created and categorised by VINNOVA. Data has been compiled because the official NACE categories (usually used to classify companies by industry) cannot easily be used for life science companies, as they are scattered among many categories. NACE categories can thus be used to identify some of the relevant companies and in the present study have been combined with other sources of information to obtain the total company population. It should be noted that there is a delay between registering a new company and the company sending in its first annual report to the Swedish Companies Registration Office. Also, other

changes due to mergers, acquisitions and liquidations appear with some delay in the statistics.

The companies have been classified into different sectors, business segments and core activities. The sectors are defined as the medical technology sector, the biotechnology sector and the pharmaceutical sector and the companies are also further divided into business segments. The companies' activities are categorised into the following activities: manufacturing, consultancy, product development and research and development (R&D). The way the companies have been categorised into business segments and activities will be described in the following section.

The analysis includes cluster profiles, development of employment and the economic development. The cluster profile is based on the distribution of individual companies in sectors, the size of the companies in terms of employees, business segments, geographical location and activities. This gives a snapshot of the life science industry as at 2006. In addition, R&D-intensive companies are classified based on whether they have a product, service or licence on the market and are conducting broad or narrow R&D. The firm development describes how the number of employees has developed for the life science industry, included sectors and business segments over a ten-year period, 1997-2006. The economic development analysis investigates production in terms of net turnover per employee and value added per employee. The latter is described in order to indicate the contribution of the life science industry to the Swedish GDP. The development of relative results describes the results after financial items relative to the net turnover. Together, these three aspects: the cluster profiles, development of employment and economic development, aim to give insights into the size, structure, development and performance of the Swedish life science industry between 1997 and 2006.

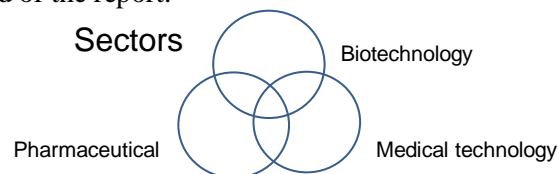
2. Variabels

Sectors and business segments

Each company has individually been categorised into both a business segment and what sector or sectors the company belongs to according to each company's main business. Companies with their main activity in business segments other than those listed below are not included in the study. There are companies whose activity can be categorised as belonging to more than one sector, due to the definitions of the three sectors. For instance, there are many companies within drug discovery that could be defined neither as exclusively pharmaceutical nor as exclusively biotechnology companies. Therefore, each company has been classified into one specific business segment, whereas there is an overlap between the three sectors.

The characteristics of companies falling into the medical technology sector are that they develop medical products that are not drugs. The characteristics of companies falling into the pharmaceutical sector are that they develop drugs and various other kinds of therapeutic products or methods. The pharmaceutical sector also includes diagnostics. The biotechnology sector is characterised by companies developing the application of science and technology to living organisms as well as parts, products and models thereof, to alter living or non-living materials for the production of knowledge, goods and services. In the sector categorisation of each individual company, the approach or method used to solve a problem or satisfy a customer or patient need was often crucial to this categorisation.

Together, these three sectors constitute what is known as the life science industry. The business segments included in this study are described below. The sectors under which companies in a particular business segment may have been categorised are also indicated below. The OECD definition of biotechnology activities has been used to identify biotech companies and is listed at the end of the report.



Business segments

Drug discovery and development

Companies can be found in *Pharmaceuticals* and *Biotechnology*.

- Research and development of new drugs and therapies. Very few pharmaceutical companies develop new drugs without using biotechnological tools. However, not all companies have the development of biopharmaceuticals, i.e. drugs based on large biological molecules such as proteins, as their goal. Rather, the large biological molecules are targets for the drugs developed. The drugs are often small molecules produced by organic chemical synthesis. In some cases, manufacturing, sales and marketing is also included in the individual company. The companies seek to develop new therapies to put on the market or license to pharma companies generating up-front and milestone payments, royalties and possibly revenues from sales on divided markets, depending on the agreement.

Drug delivery

Companies can be found in *Pharmaceuticals* and *Biotechnology*.

- Companies in the drug delivery business segment are conducting research on how the active substances in medicines can be made to reach their target molecules in the body and how a satisfactory uptake of these substances can be ensured. Their clients are mainly biotech and pharma companies involved in drug discovery and development. An increasing business area includes developing new formulations for existing drug substances so that they can be used for new indications. Using existing substances reduces development time, as they have already passed the regulatory process for another indication. The field of nanobiotechnology is expected to generate new solutions on how to administer drugs more specifically. Polymer chemistry, nanotechnology and surface chemistry are examples of possible required expertise.

Biotech medical technology

Companies can be found in *Biotechnology* and *Medical technology*.

- Provides health services with that part of medical technology which has a biotech basis according to the OECD definition, including equipment and instruments for in-vitro fertilisation, cell cultivation, substitute plasma, blood management, plus the use of biodegradable biomaterials to replace or repair damaged tissue.

Diagnostics

Companies can be found in *Pharmaceuticals*, *Biotechnology* and/or *Medical technology*.

- The companies develop tools and techniques for diagnostics and most of their customers are healthcare sector, clinical laboratory analysis companies and end consumers for home use. In the company population at hand, all biotechnology diagnostic companies, often developing antibody-based tests, also fall into the pharmaceutical classification. Medical technology diagnostic products can be technical appliances for measuring or visualising diagnostic results or in-vitro diagnostic tests. A difference compared to companies developing new drugs is that the process from idea to commercialisation of diagnostic products, processes and services is usually shorter.

CRO companies

Companies can be found in *Pharmaceuticals* and/or *Biotechnology*.

- CRO (Contract Research Organisation) companies include clinical research organisations dealing with products and services for assisting other companies in clinical trials and regulatory processes. Clinical research organisations need to be familiar with international regulations and regulatory bodies as well as having well-developed contacts in clinical research, hospitals and authorities. Some CROs have developed a technology platform or analysis system that is managed within the company and accessible to companies in the pharmaceuticals and/or biotechnology sectors by contract research.

Drug production (not biotech)

Companies can be found in *Pharmaceuticals*.

- Companies specialising in drug production and which do not have their own research operations are included in this business segment. The use of biotechnology in the manufacturing of drugs is not included. Instead, those companies are found in the Bioproduction category. Important issues include

development of cost-effective process and production technology as well as regulatory requirements.

Biotech tools and supplies

Companies can be found in *Biotechnology*.

- The companies develop products and services for use in production, processes, research and development. This includes equipment for bioseparation, biosensors, biomolecular analyses and bioinformatics. Their customers mainly consist of other biotechnology companies, the pharmaceutical and medical technology sector and university research teams but also other industries basing their products on biological raw materials, for instance in the food, forestry and agricultural sectors. Their expertise lies within application of interdisciplinary expertise combining technologies such as electronics, ICT, mechanics, optics and materials engineering with life science to develop their products and services.

Bioproduction (healthcare related)

Companies can be found in *Biotechnology* and *Pharmaceuticals*.

- Biotech production of drugs, biomolecules, cells or microorganisms for use in healthcare related products such as diagnostics and pharmaceuticals. These are specialised manufacturing companies whose clients include the pharmaceutical sector, other biotech companies or research groups. The biomolecules are often enzymes or antibodies. The companies' core expertise is development of cost-effective production solutions - adapting their activity to internationally stipulated regulatory requirements on quality and safety, plus an ability to adapt to customer requirements.

Agricultural biotechnology

Companies can be found in *Biotechnology*.

- Plant-related products. Plant or tree breeding utilising biotech methods as tools in the cultivation work. Few companies, however, use gene technology as a method for obtaining specific properties in the end products (genetic modification). Also included is plant protection based on naturally occurring microorganisms or biomolecules as well as the processing of land-based raw materials with the aid of biotechnology. Companies working with genetic modification for agricultural purposes need to be aware of, and have a strategy for addressing, attitudes in society regarding the use of gene technology in plant cultivation.

Environmental biotechnology

Companies can be found in *Biotechnology*.

- Biotech solutions to environmental issues such as water purification, land decontamination (bioremediation) and waste management, and laboratory analysis. Their customers include municipalities, construction companies, and industries requiring purification of water used in manufacturing processes. Companies within this field have very diverse focuses and it is therefore difficult to highlight a common core expertise. Some of these companies use non-pathogenic, naturally occurring microorganisms and the laboratory analysis companies develop specific testing methods and analytical measurement tools, to measure toxic substances for instance. However, biosensors are included in the Biotech tools and supplies business segment.

Food-related biotechnology

Companies can be found in *Biotechnology*.

-The products of companies in the field of food-related biotechnology include biotechnically-produced components or ingredients for the development of foods with positive health benefits, e.g. probiotics. The term functional food denotes a product with a documented, well-defined, product specific diet-health relationship. The aim of these products is to reduce the risk of developing diseases rather than cure them. Examples of other possible areas found in the category include use of enzymes in food processes or as additives, or the development of quality control in the food sector by means of new biotechnological techniques. These companies are often intermediaries between academic research and the food industry. They need both expertise within their niche, e.g. within microbiology, nutrition, process technology, and knowledge of potential markets, public attitudes/demand and the needs about the food industry. The food industry, which uses biotech tools in its processes for example, is not included in the population.

Industrial biotechnology

Companies can be found in *Biotechnology*.

- Process development of biotechnology applied to industrial processes for large-scale biotechnological production, e.g. designing an organism to produce a useful chemical or using enzymes as industrial catalysts to produce valuable chemicals. Industrial biotechnology solutions tend to consume fewer resources than traditional processes used to produce industrial goods. The forest, pulp and paper industry and the food industry has not been included

since the core competence in those companies is not biotechnology even if the technology is used to some extent.

Healthcare equipment

Companies can be found in *Medical technology*.

- Companies producing fittings and furniture for health services such as lighting, patient lifts, examination couches and treatment tables. To be included, their major business must be products for the healthcare sector. The companies are often manufacturing companies with an understanding of needs within the healthcare sector.

Active and non-active implantable devices

Companies can be found in *Medical technology*.

- Implantable orthopaedic or other medical devices which may be biologically active, like pacemakers. Specialist expertise in different medical fields, materials science and tissue response to materials; for instance concerning risk of infection is needed. Materials may be titanium, ceramics and steel. Implants are usually developed in close collaboration with the healthcare sector.

Anaesthetic/Respiratory Equipment

Companies can be found in *Medical technology*.

- Development of anaesthetic equipment and solutions for supervision or control of respiration. The products are mainly used for critically ill patients i.e. within the intensive care unit (respiratory equipment) and in the operating room (anaesthetic and/or respiratory equipment). Anaesthetics may be delivered to the patient intravenously or by inhalation. Products are developed in a combination of medical expertise, including expertise in the anaesthetic qualities of different gases, as well as expertise in a number of engineering fields such as mechanics and electronics for pneumatic systems, and valves and sensor technology and computer programming for monitoring and control systems.

Dental devices

Companies can be found in *Medical technology*.

- Develops instruments and technical appliances used by dentists. Development of dental implants, screws and the manufacturing of disposables and supplies for use in dental clinics are also included. Dental laboratories on the other hand, are not included.

Electromedical and imaging equipment

Companies can be found in *Medical technology*.

- Technical equipment used for patient care and supervision or visualising of conditions. This business segment includes a broad range of products used in many medical fields such as magnetic resonance imaging, computed tomography, positron emission tomography and dialysis equipment. Many companies are large with diversified business and may also develop products falling into other business segments. The companies identified require technical as well as medical expertise, in such fields as radiotherapy, haematology, cardiology, dialysis and oncology.

Ophthalmic devices

Companies can be found in *Medical technology*.

- Companies dedicated to surgery or medical appliances within the field of ophthalmology. The required expertise ranges from ophthalmic surgical technology like cataract surgery. Products include laser vision products, cataract products and computer software for imaging the inside of the eye. The latter may be used for diagnosing eye conditions.

Surgical instruments and supplies for electromedical and imaging applications

Companies can be found in *Medical technology*.

- Includes instruments and tools used in patient care or surgery, and accessories for electromedical and imaging equipment. This business segment includes companies that develop products that may facilitate different medical procedures, i.e. scalpels, forceps, dissectors and clamps. The required expertise ranges from production of instruments to knowledge within the different surgical fields. There are also companies developing products connected to surgery, such as hypothermia products.

Medical disposables

Companies can be found in *Medical technology*.

- Disposable products used in patient care, such as dosage cups, hypodermic needles, sponges, contrast agents, wound care products etc. Some of the products can be used in research and at clinical laboratories. These companies are often manufacturing companies. Knowledge of industrial processes, sterilisation techniques and material chemistry is important. Characteristic of some companies is knowledge of the processes behind wound healing and the optimal conditions for wound care.

CRO medtech

Companies can be found in *Medical technology*.

- Medical technology contract research organisations provide services for development, manufacturing and quality control of medical technology products. They often develop software or IT solutions for problems arising within the medical technology sector or provide expertise in developing medical products and devices. However, instead of selling a product, they provide a service based on their technical platform or other expertise. The expertise of some companies includes knowledge about regulatory requirements and how to achieve market approval.

IT and training

Companies can be found in *Medical technology*.

- Companies developing software and IT solutions for patient care or supervision etc. Training software for patients and personnel in the healthcare sector is also included. The products often facilitate the handling and integration of large volumes of information or provide analytical tools for clinicians that could function as diagnostic support.

Activity category

Broad research & development

Companies with exploratory research and development within a broad field of expertise or with several parallel development projects/product lines. Within some companies there is also sales and marketing activity and manufacturing.

Companies without products on the market are shown in a separate field. In this context, co-operative agreements and licensing providing revenue have also been counted as “products on the market”.

Narrow research & development

Companies with exploratory research and development within a narrow field of expertise or concentrating on one development project/product line. Within some companies there is also sales and marketing activity and manufacturing.

Companies without products on the market are shown in a separate field. In this context, co-operative agreements and licensing providing revenue have also been counted as “products on the market”.

Product development

Companies which principally develop their own products/services, i.e. incremental product development without elements of exploratory research.

Consultancy

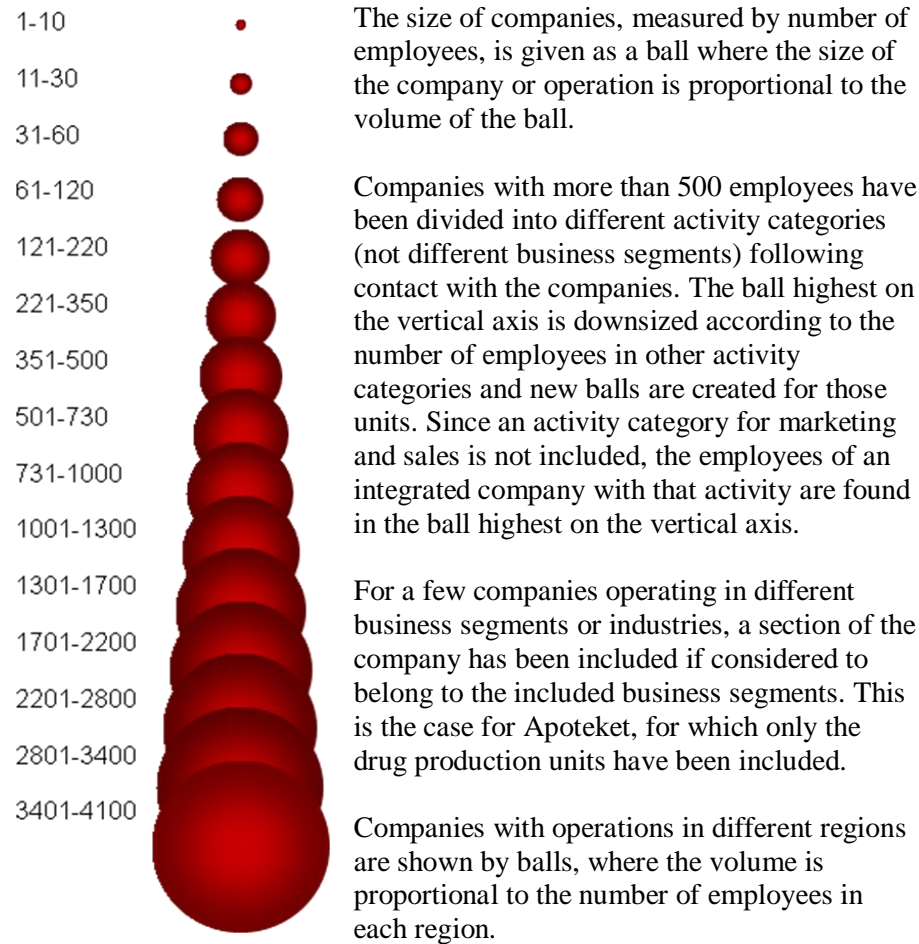
Companies which principally carry out consultancy and commission activity. All CRO companies are included here.

Manufacturing

Manufacturing of biotech products, drugs or medcotech products. Including companies specialised in manufacturing but also the production units of integrated companies with more than 500 employees.

Number of employees

What is shown as “number of employees” in the report is the mean value of the number of full-time equivalent employees in 2006, i.e. the number reported by companies in their annual report to the Swedish Companies Registration Office. The actual number of people employed in companies may be 20-30% higher due to part-time posts, leave of absence etc.



Regions

Stockholm/Uppsala

Comprising the counties of Stockholm, Uppsala and Södermanland. Ongoing initiatives are Stockholm Business Region, UppsalaBio and BiotechValley (Stockholm-Uppsala BioRegion).

Malmö/Lund

Comprising Skåne County. The ongoing initiative is “Medicon Valley Alliance”, which also includes Copenhagen (Copenhagen not shown in this study).

Gothenburg

Comprising the counties of Västra Götaland and Halland. Ongoing initiatives are “Biomedical Development in Western Sweden” and “MedCoast”, which also includes Oslo (Oslo not shown in this study).

Linköping

Comprising the county of Östergötland. The initiatives in operation are “BioMedley” and “New Tools for Health”.

Umeå

Comprising the counties of Västerbotten, Norrbotten and Västernorrland. The initiative in operation is “Biotech Umeå”.

Rest of Sweden

Includes the identified companies which lie outside of the regions described above.

Comments

Companies included

Companies which have their major activity within the previously described selection of business segments with at least one employee in 2006 are included in the ball diagram and are listed later on in the present report.

Companies not included

Companies devoted to marketing and sales of life science products are not included. Subcontractors to companies within the selection of business segments which do not have their core activity within these fields of expertise are not included. This may apply to such enterprises as design companies, companies within manufacturing (if the operation is not entirely concentrated on included business segments), mechanical, optics and electronics companies, PR agencies, venture capital companies and patent and business advisers. The scope of these activities is very difficult to estimate.

Companies conducting laboratory analysis services, often service laboratories to the healthcare sector, plus orthopaedic and dental laboratories and companies developing products sold by opticians have not been included at all in the present study.

Companies within fields such as disability aids (e.g. rollators and wheelchairs), prostheses or hearing aids which are not bone-anchored and orthopaedic devices are not included in the ball diagram. However, some such companies with manufacturing, consultancy, product development or R&D have been identified and these include approximately 2,180 employees in 74 companies.

Companies developing laboratory equipment which can be used in many sectors are not included in the ball diagram either. However, some such companies with manufacturing, product development or R&D have been identified and they have approximately 687 employees in 23 companies.

Division of companies into regions and different activity categories

For companies with operations in several regions, their activity in each region is shown. Companies with more than 500 employees are also divided into different activity categories shown as separate balls, for instance showing the number of employees within manufacturing.

Assessment

Details of business segments, activity categories and markets are not available in general statistics, but require assessment based on information from different sources. The categorisation has been made by VINNOVA.

Companies with fewer than 500 employees and several activity categories within the company have been placed in the activity category which is highest on the vertical axis. This means if the company has both the activities product development and manufacturing, they have been placed under “Product development” on the vertical axis.

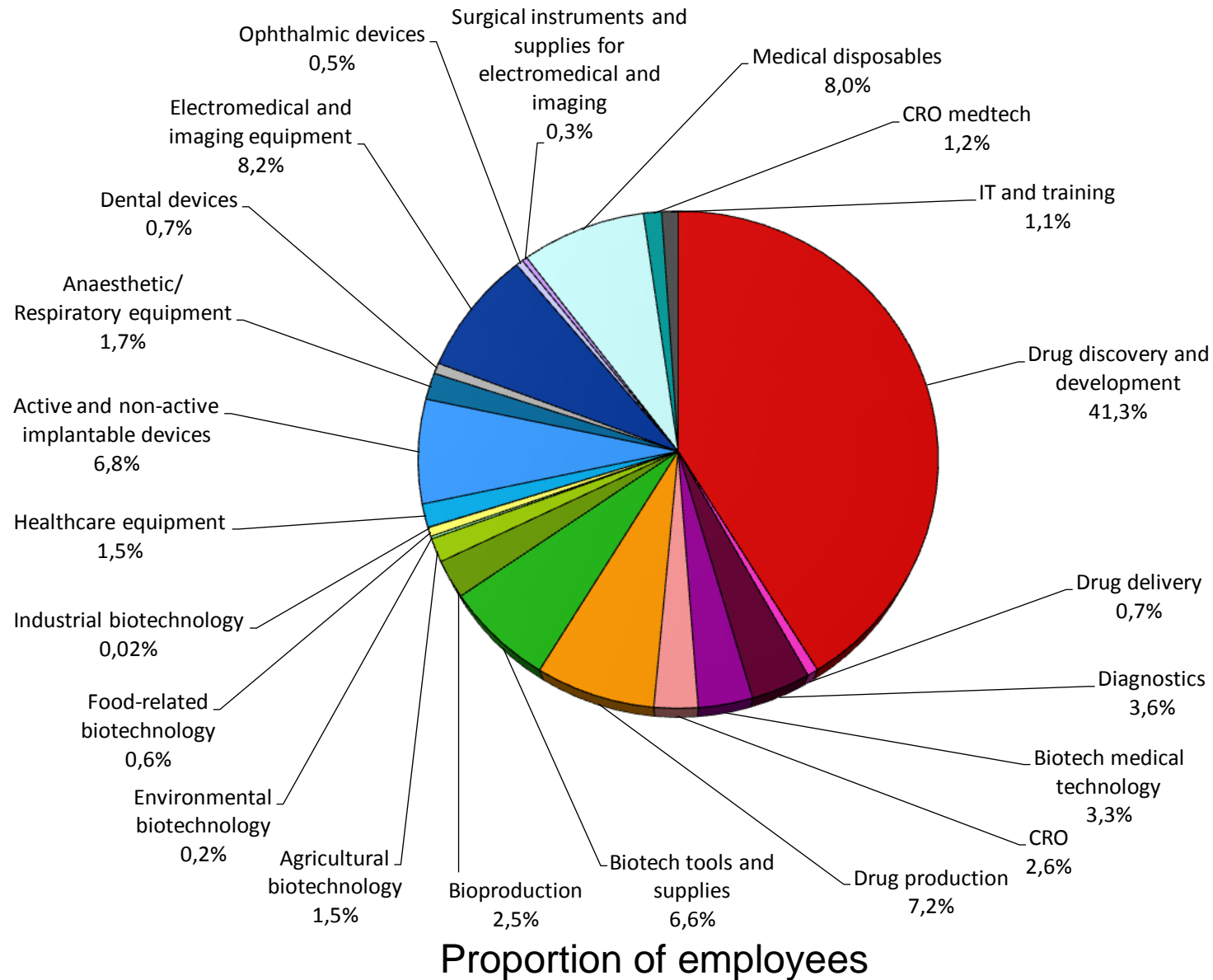
Ball diagram

The ball diagram used in this study shows four variables simultaneously:

- Geographical location (horizontal axis)
- Activity category (vertical axis)
- Business segment (colour)
- Company size in terms of the number of employees (ball size)

Readers may thus draw their own conclusions based on different combinations of the variables.

3. The Life Science Industry 2006



All companies

The total number of companies active in research and development, product development, consulting or manufacturing within the included business segments of biotechnology, pharmaceuticals and medical technology in Sweden is approximately 620 with a total of almost 34,500 employees. This does not include the companies focusing on marketing and sales. Those companies have over 7,200 employees distributed among about 210 companies. This leads to a total size of the industry amounting to 830 companies and 41,700 employees. There are also many companies with no employees that are still active according to Swedish Companies Registration Office and not included in the ball diagram or figures mentioned above. One business segment not included in the ball is laboratory equipment not specifically designed for use in the biotechnology, pharmaceuticals or medical technology sectors. If these were also included, the total number of employees and number of companies would be approximately 42,400 and 850 respectively.

Research-intensive companies and manufacturing companies far outnumber the companies in other activities and jointly make up more than 80% of all included life science companies. Among the companies with broad R&D, the vast majority have a product or license on the market. Companies with narrow R&D have a product or license on the market to a much lesser extent. There are some cases of very small companies conducting broad R&D. The information obtained during the categorisation process implies that they often collaborate with a university or are spin-offs from university departments.

It should be kept in mind that the business segments add up to the total number of employees whereas the three different sectors do not. This is because there is an overlap between the sectors. A list of all companies included appears at the end of the report.

The large companies

Large companies or company groups with more than 500 employees involved in different activities have been separated so that the employees are assigned to the proper types of activities (vertical axis). Units in different regions have also been considered (horizontal axis). For instance, AstraZeneca is located in Lund, Mölndal and Södertälje. Production is mainly carried out in Södertälje and research and development in Södertälje, Mölndal and Lund.

GE Healthcare Biosciences is active in Umeå, Lund, Stockholm and Uppsala. Research and development is conducted in Uppsala and production in Uppsala, Umeå and Malmö/Lund. A marketing and sales office is situated in Stockholm. Pfizer has its production activity in Stockholm and Strängnäs, marketing and sales activity in Stockholm. A few employees are also found in Uppsala.

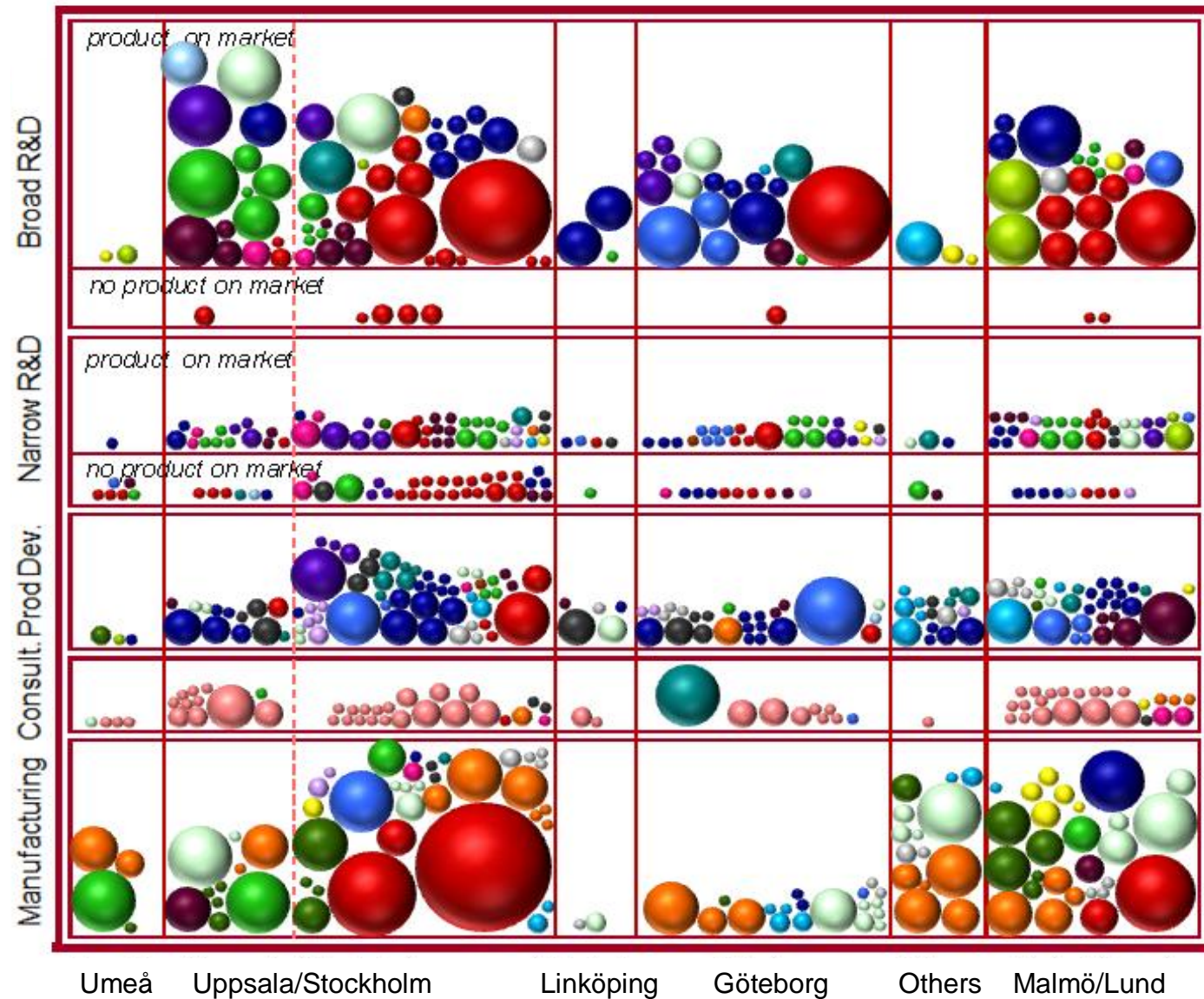
Most of the larger business segments include a few big companies which have major impact on the size of that business segment. This applies to drug discovery and development, electromedical equipment, and biotech tools and supplies in particular. Drug discovery and development is highly dominated by AstraZeneca with 9,760 employees, corresponding to 28% out of the total sector employment, once companies devoted to marketing and sales have been excluded. Since 2003, there have been several changes among the large

groups of companies. For instance, GE Healthcare Biosciences has acquired Amersham Biosciences in Sweden. This is further exemplified in the employment development section. Other large companies include the Getinge group, McNeil Sweden, Gambro, St Jude Medical, Recip, Fresenius Kabi and Biovitrum.

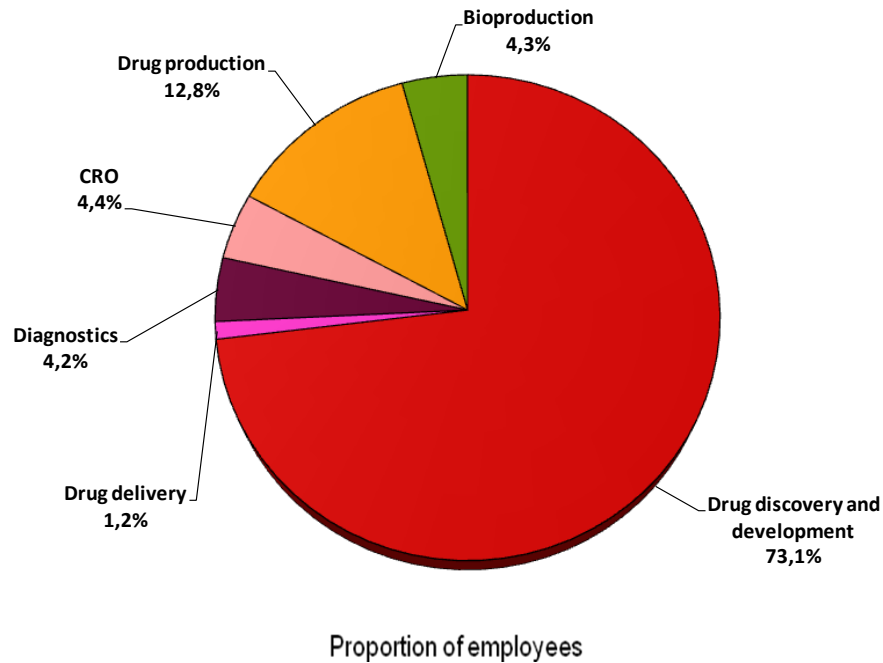


Cluster Profile Sweden

- Drug discovery & development
- Drug delivery
- Biotech medical technology
- Diagnostics
- CRO
- Drug production
- Biotech tools and supplies
- Bioproduction
- Agricultural biotech
- Environmental biotech
- Food-related biotech
- Industrial biotech
- Healthcare equipment
- Implantable devices
- Anaesthetic/Respiratory eq.
- Dental devices
- Electro medical and imaging eq.
- Ophthalmic devices
- Surgical instruments
- Medical disposables
- CRO medtech
- IT and training



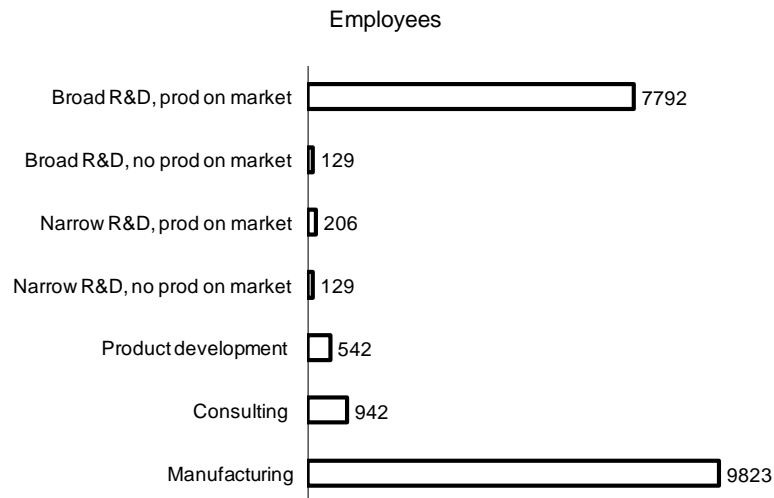
Pharmaceutical companies



Comments

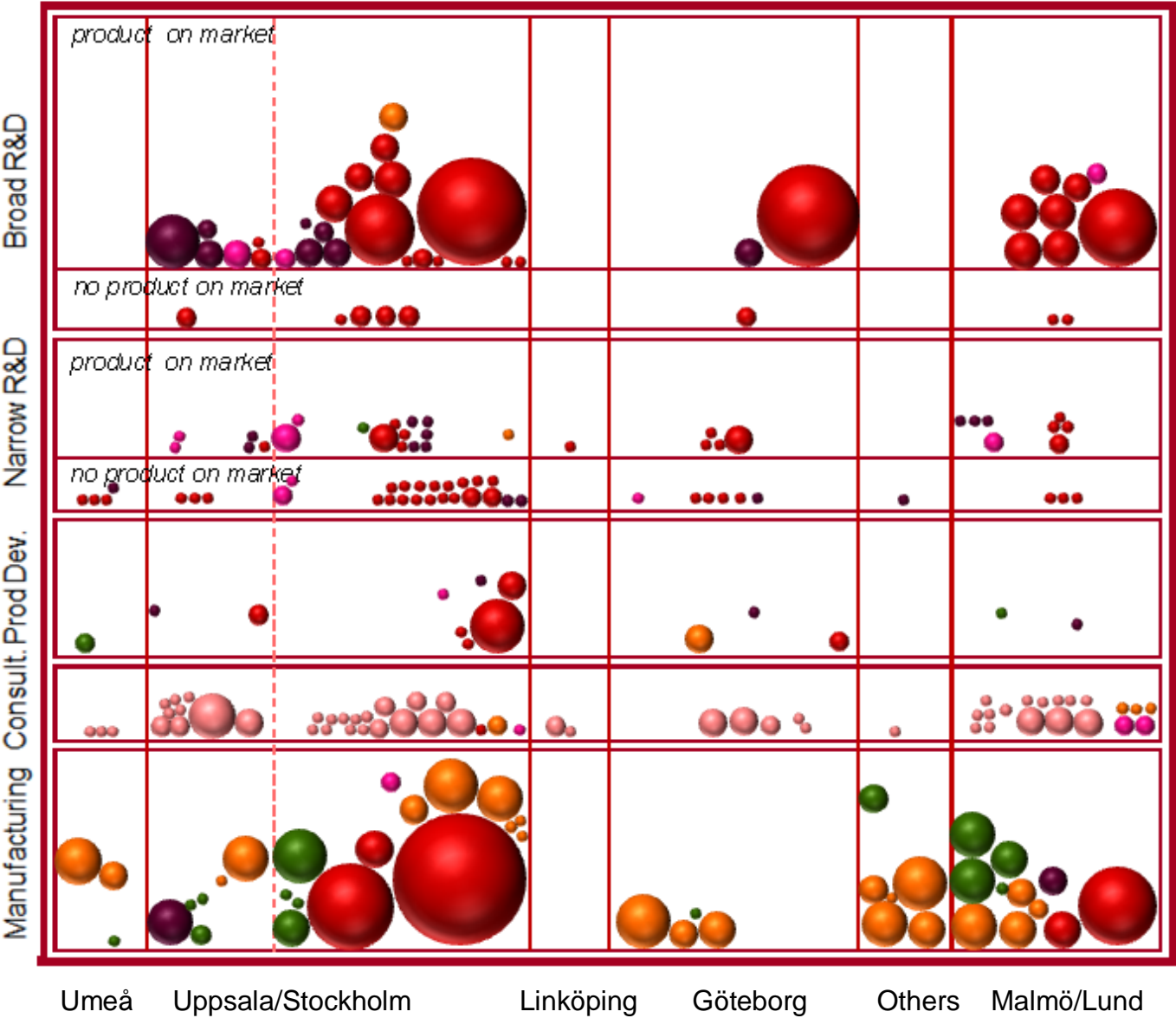
The pharmaceutical sector comprises about 19,500 employees, not including marketing and sales companies, in 229 companies and is dominated by AstraZeneca. AstraZeneca constitutes almost half of the pharmaceutical sector in terms of the number of employees. Drug discovery and drug development is by far the largest business segment, which is mainly related to the size of AstraZeneca. Also Pfizer and Biovitrum contribute a significant number of employees in this business segment. Diagnostic companies are also included in the pharmaceutical sector.

Most of the research-intensive companies, i.e. categorised in the R&D activity category in the present study, are in the category of narrow R&D and less than 20% of these have a product on the market. Among the companies which have reached the market with a product or licence, the vast majority perform broad R&D. Product development does not involve many of the employees in the sector. Companies developing new drugs are predominately found in the categories including exploratory research, whereas some of the companies developing diagnostic tests are in the product development category. Many of the employees in the drug discovery and development business segment are in the manufacturing activity category, largely due to AstraZeneca's manufacturing units.

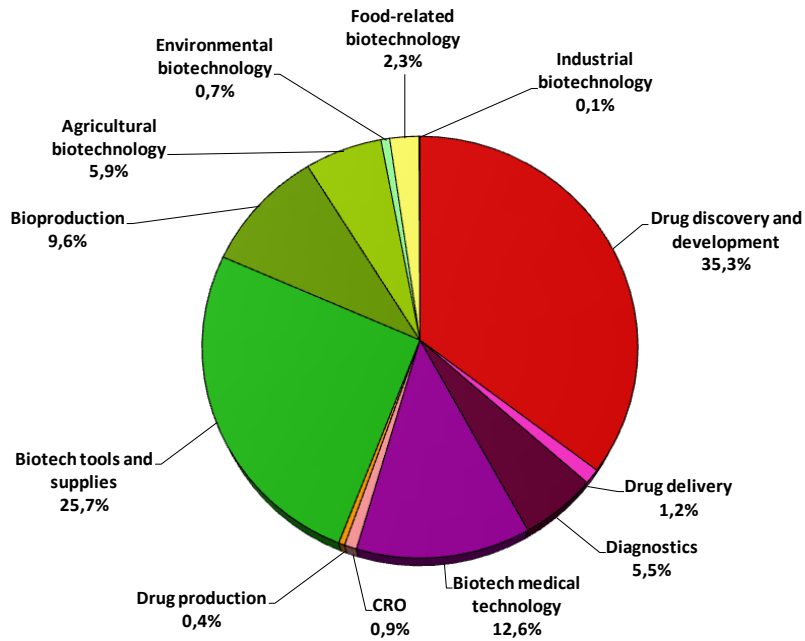


Cluster Profile Sweden

- Drug discovery & development
- Drug deliver
- Diagnostics
- CRO
- Drug production
- Bioproduction



Biotechnology companies



Proportion of employees



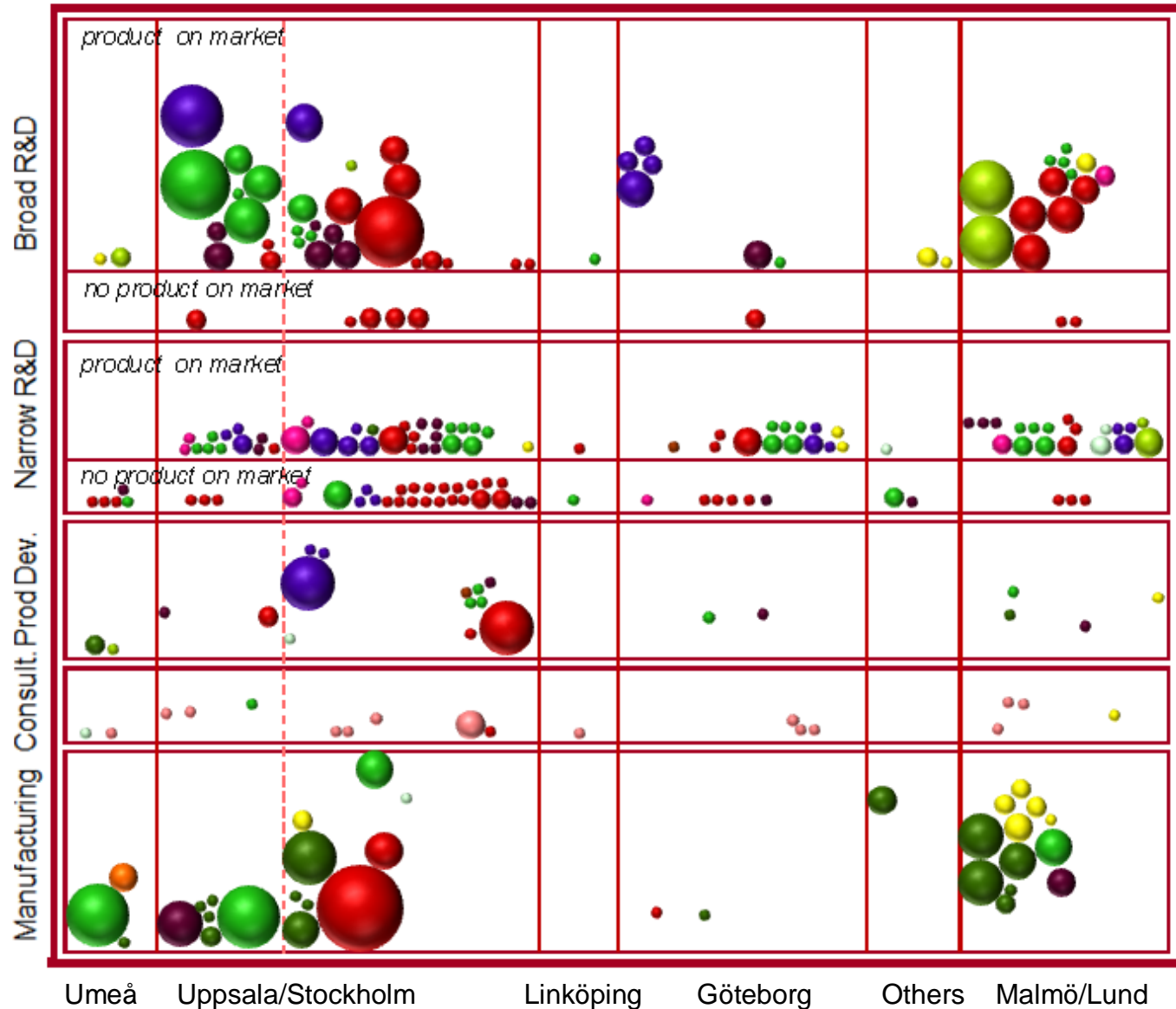
Comments

The biotechnology sector includes 8,930 employees in 251 companies and the majority are active in either biotech tools and supplies, bioproduction or drug discovery. This sector does not comprise AstraZeneca but a few other large companies like the Pfizer bioproduction unit in Strängnäs and GE healthcare Biosciences. The companies are active in the bioproduction and biotech tools and supplies business segments respectively.

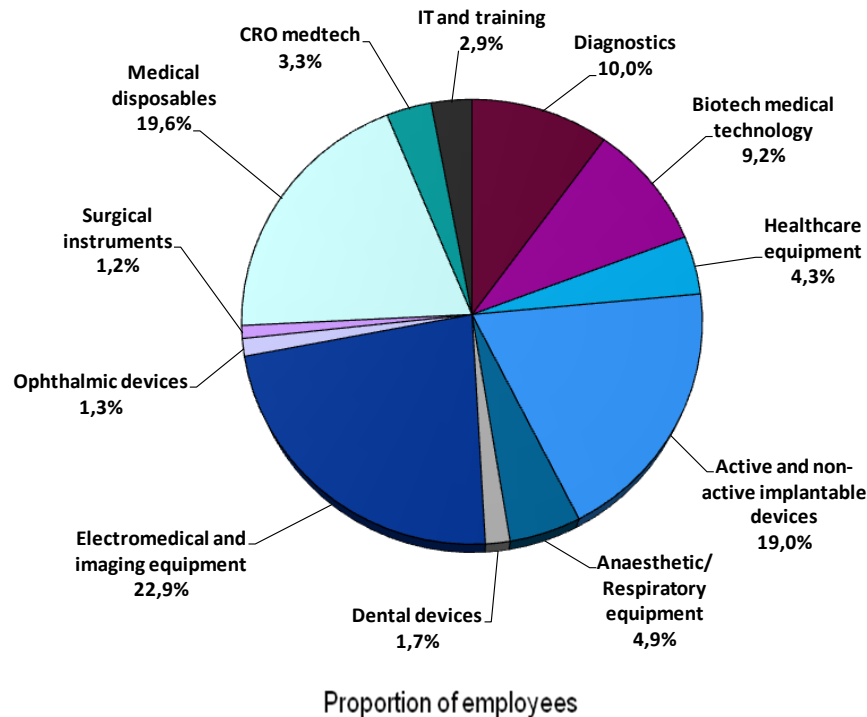
In terms of employees, the biotechnology sector is dominated by R&D and manufacturing. It has a larger share of employees in companies categorised as being involved in narrow R&D compared to the pharmaceutical and medical technology sectors where broad R&D dominates. In the business segments “drug discovery and development” and “biotech tools and supplies”, more companies are performing narrow R&D than broad R&D. A majority of the “biotech tools and supplies” companies have a product on the market, whereas this is rare among the biotech “drug discovery and development” companies.

Cluster Profile Sweden

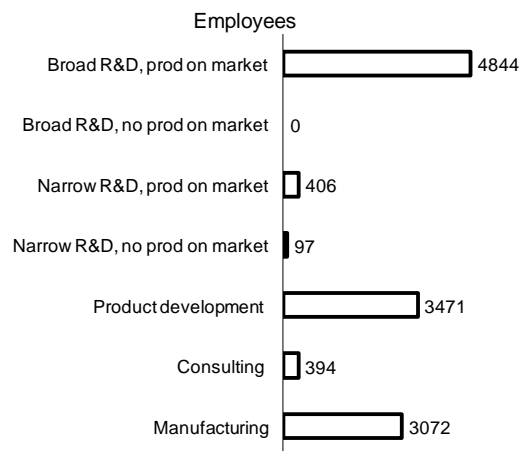
- Drug discovery & development
- Drug delivery
- Biotech medical technology
- Diagnostics
- CRO
- Drug production
- Biotech tools and supplies
- Bioproduction
- Agricultural biotech
- Environmental biotech
- Food-related biotech



Medical technology companies



Proportion of employees



Comments

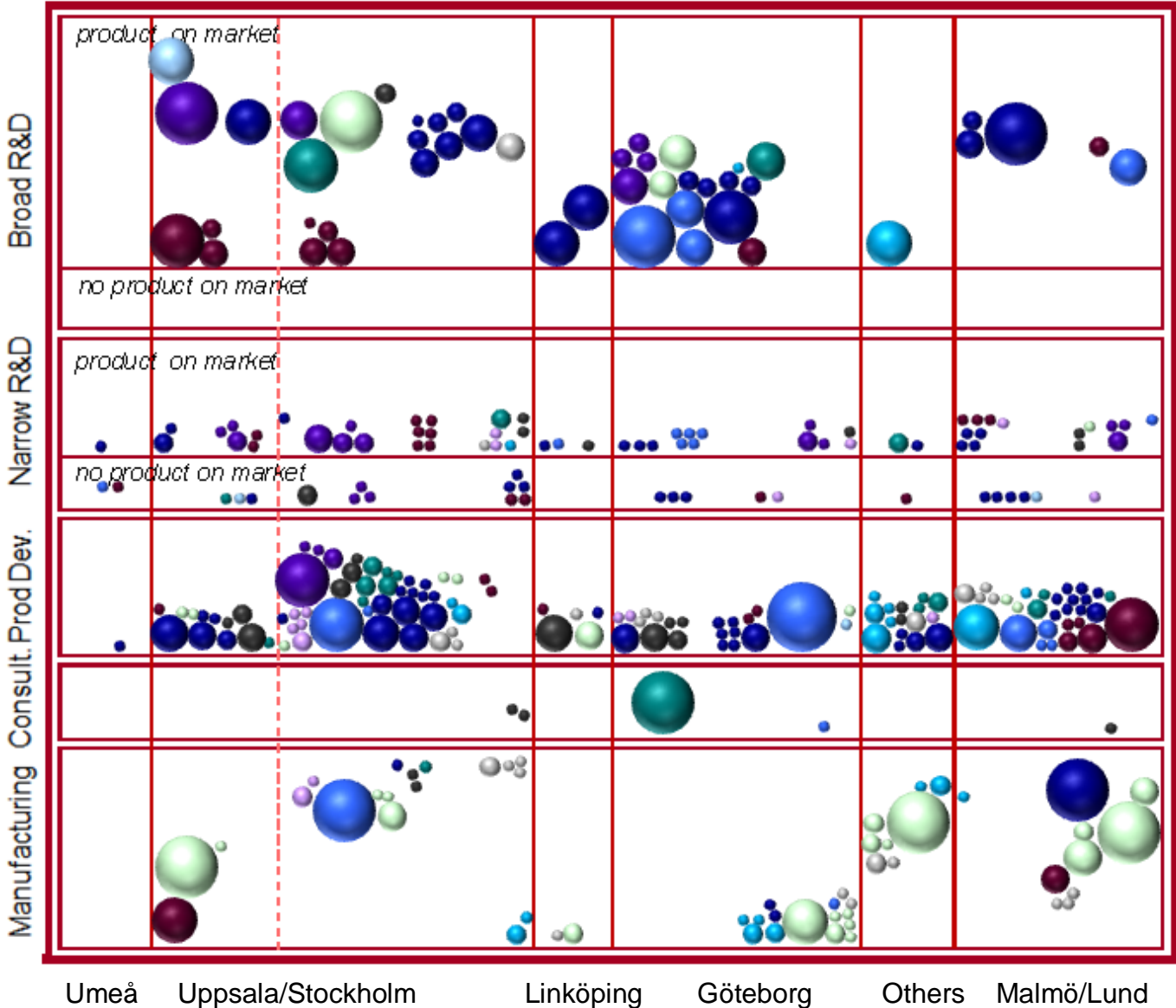
The medical technology sector employs 12,280 people in 326 companies. It is dominated by the three business segments electromedical equipment, active and non-active implantable devices, and medical disposables which jointly employ almost 60% of the total employees in the sector. A larger share of medical technology companies are categorised as belonging to “product development” activity than for the two other sectors. To develop these types of products usually takes less time than for drugs but as with drugs, the products have to go through a regulatory process. Once a technical appliance is launched onto the market, the product is often subject to further development. The companies performing product development are mainly found in the business segments of electromedical equipment and anaesthetic/respiratory equipment.

Manufacturing includes many companies producing medical disposables and also dental devices, whereas R&D is dominated by companies in the electromedical equipment business segment. In the medical technology sector, almost all companies performing broad R&D have a product on the market. The narrow R&D category constitutes a very small share of all employees performing R&D, just as for the pharmaceutical sector.

Companies within fields such as disability aids (e.g. rollators and wheelchairs), prostheses or hearing aids which are not bone-anchored and orthopaedic devices are not included in the ball diagram. However, some such companies with manufacturing, consultancy, product development or R&D have been identified and these include approximately 2,180 employees in 74 companies. Including these in the medical technology sector increases its size to 14,510 employees and more than 400 companies involved in manufacturing, consultancy, product development or R&D.

Cluster Profile Sweden

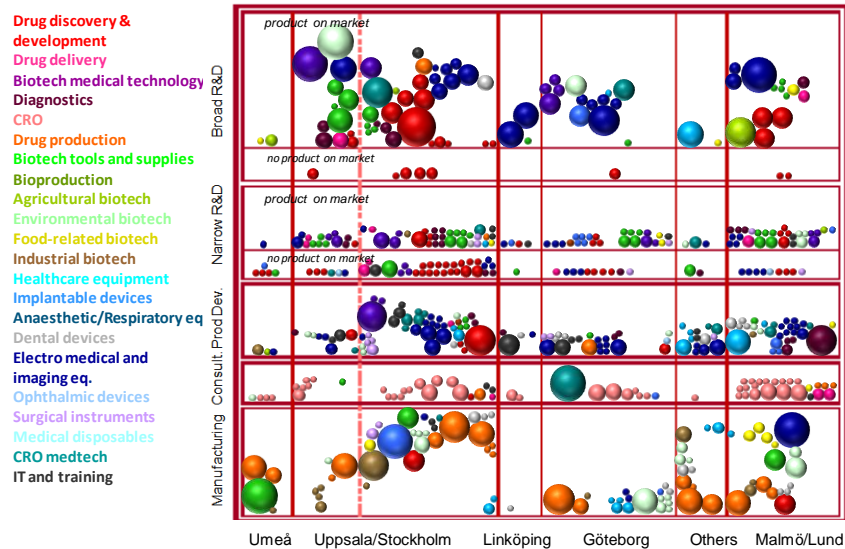
- Biotech medical technology
- Diagnostics
- Healthcare equipment
- Implantable devices
- Anaesthetic/Respiratory eq.
- Dental devices
- Electro medical and imaging eq.
- Ophthalmic devices
- Surgical instruments
- Medical disposables
- CRO medtech
- IT and training



Parent company nationality

Swedish-owned companies

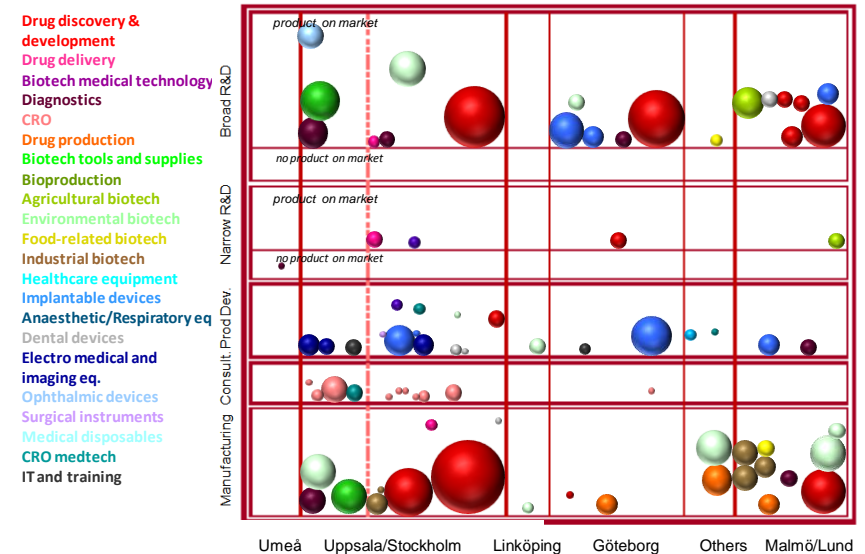
Cluster Profile Sweden



Foreign-owned (in terms of parent company nationality) life science companies are often large companies active within broad R&D or manufacturing. With almost no exceptions, they are companies that have managed to put a product on the market. Companies with narrow R&D, either with or without products on the market, are unlikely to be foreign-owned. The consultancy sector is also underrepresented among the foreign-owned companies. There is a similar distribution between the different sectors when it comes to foreign ownership among the companies. Companies with a non-majority foreign ownership are not included in the foreign-owned companies. Foreign-owned pharmaceutical companies are often US-owned, Swiss or British. There are also several Dutch-owned companies, like Qpharma and Polypeptides laboratories, plus Danish-owned Novozymes Biopharma AB and NeuroSearch Sweden AB. In terms of number of employees, British ownership dominates due to AstraZeneca.

Foreign-owned companies

Cluster Profile Sweden



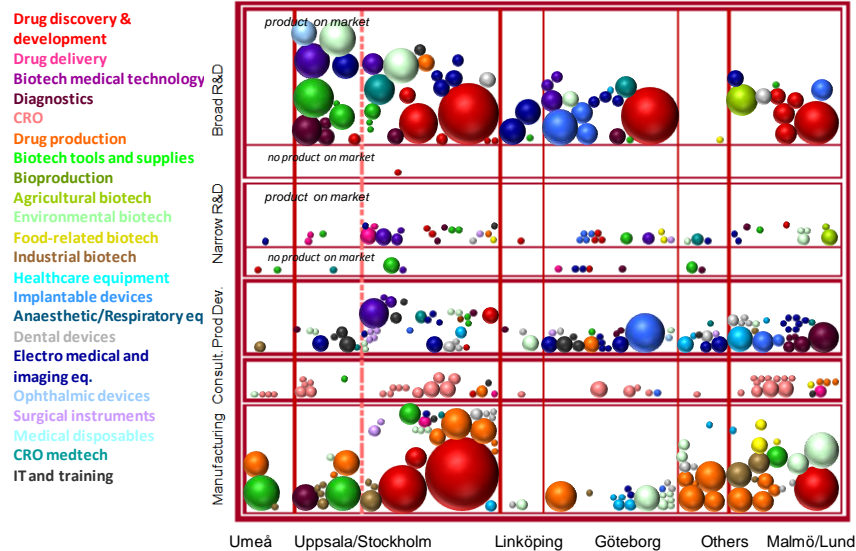
Among the foreign-owned biotech companies, parent companies from the US are well-represented; the largest are GE Healthcare Biosciences AB and Pfizer Health AB. Parent companies in the Netherlands own DSM AntiInfectives Sweden AB, EuroDiagnostics and LTP Lipid Technologies Provider AB. Parent companies in Switzerland own Syngenta Seeds AB and Ferring AB.

Most of the foreign-owned medical technology companies are owned by parent companies from the US. They are often medium-sized (50-249 employees) or large companies (>249), like Cederroth International AB, Becton Dickinson Infusion Therapy AB, St. Jude Medical AB, Advanced Medical Optics Uppsala AB, GE Medical Systems Sverige AB. The largest British-owned companies are Astra Tech AB and PaperPak Sweden AB. Luxemburg is also relatively well-represented, which is not the case for the other two sectors. The largest Luxemburg-owned companies are Phadia, Allergon and Ascendia MedTech AB.

Positive or negative business results

Positive results

Cluster Profile Sweden

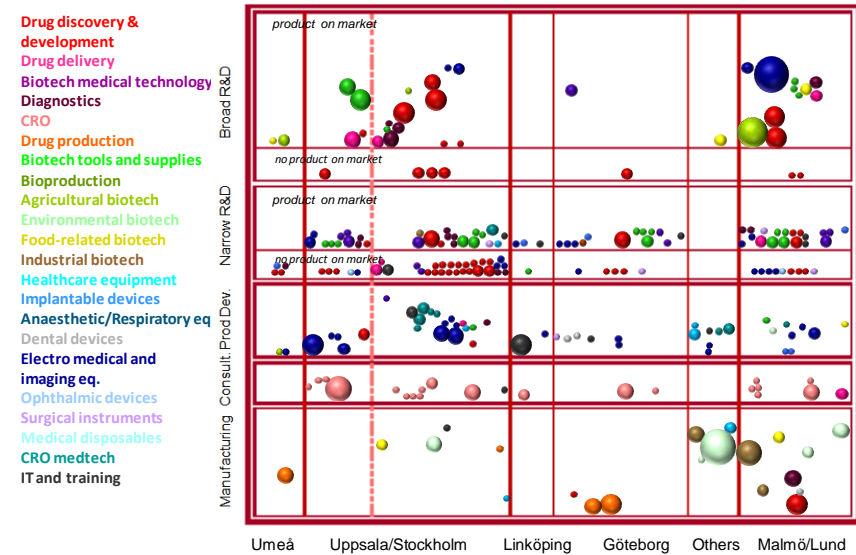


The companies with positive results after financial items in 2006 are shown above. The large companies are overrepresented among the companies with positive results. Companies that perform broad R&D also mainly show positive results. Within the group of companies with a product on the market, the companies that perform broad R&D predominantly have positive figures whereas those that perform narrow R&D mainly are on the negative side. Manufacturing companies mostly show positive results.

Companies with a zero result appear in the above ball diagram of companies with positive business results.

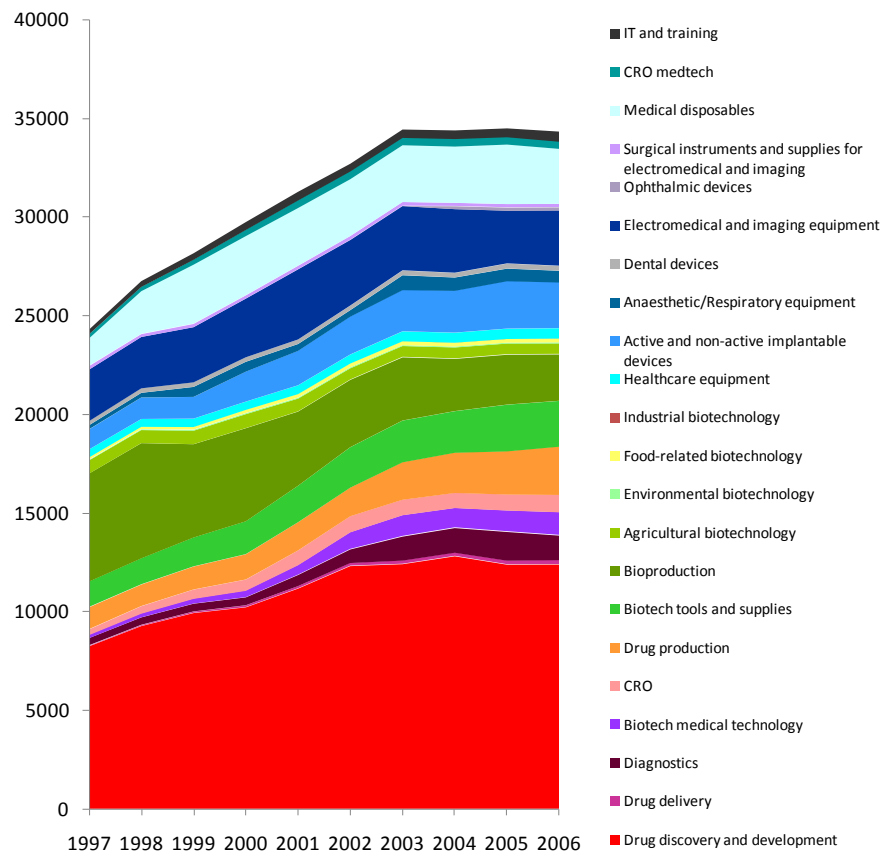
Negative results

Cluster Profile Sweden



The companies with negative results after financial items are shown above. The small companies are overrepresented among the negative results. Small drug discovery companies often show negative results. Of the companies that perform narrow R&D, more show negative results in comparison to those that perform broad R&D. As the location of many small drug discovery companies, Stockholm also holds many companies with negative results. Many of the consultancy companies show negative results. Many recently started small companies number among those with negative results.

4. Employment development in the industry 1997 - 2006



Expansion

Growth of the sectors and business segments over the periods 1997-2006 and 2003-2006.

The collection of data to build the company database was initiated in 1997 for the biotechnology sector and in 2003 for the medical technology and pharmaceutical sectors. Thus, the 1997-2003 result of the two latter sectors as well as the data from the total life science industry over the period 1997-2003 should be interpreted with caution since one underlying factor of the growth is that the firm population for 1997-2003 may be incomplete. Thus, an unknown share of the over 80% increase for the medical technology sector is likely to be due to companies with medical technology activities before 2003 being absent from the database. The error is likely to be smaller for the pharmaceutical sector since many of the smaller companies are also found in the biotechnology sector; these were included in the 1997 biotechnology database, as were the major players like Astra and Pharmacia. With this in mind, however, all three sectors have grown since 1997.

The life science industry in total has grown with more than ten thousand employees over the ten year period 1997-2006. The small and medium sized companies (SMEs) are primarily responsible for the growth. Excluding companies larger than 500 employees, the SMEs still stand behind the vast majority of the increase in terms of employees. One explanation for this is that although some large companies have increased in terms of employees, others have had large declines. The R&D-intensive companies, large companies included, also make out the vast majority of the increase in terms of employees, meaning that predominantly R&D-intensive companies are responsible for the large increase of the entire life science industry.

However, over the period 2003-2006, the life science sector has remained practically unchanged in terms of employment. The medical technology and biotechnology sectors have declined, whereas the pharmaceutical sector has increased. The non-R&D-intensive biotech companies show a decline of 20.5% whilst the R&D-intensive companies have increased by 2.7%. However, the non-R&D-intensive group of biotech companies is responsible for fewer than half of the employees compared to the group of R&D-intensive companies. Among the pharmaceutical companies on the other hand, both the R&D-intensive group and the non-R&D-intensive companies show a slight

decrease in number of employees. The R&D-intensive medical technology companies also slightly declined, whereas the non-R&D-intensive companies increased by 3.4%.

Another way of analysing the expansion is to focus on the companies that have grown and show their characteristics. It turns out that over the ten-year period, the population of growing companies has increased by over 100% overall. In the group of growing companies, R&D-intensive companies are responsible for 64% of the increase. It should be noted that among the companies having more employees in 2006 than they did in 1997, many have decreased their number of employees since 2003.

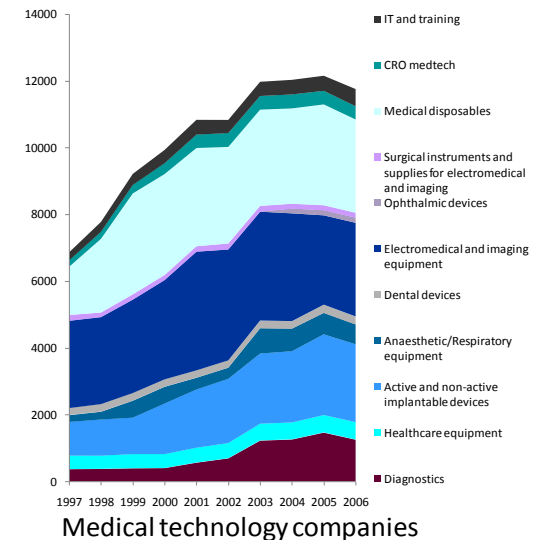
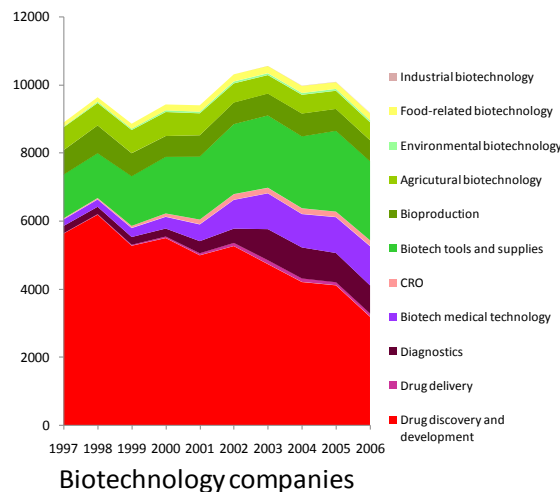
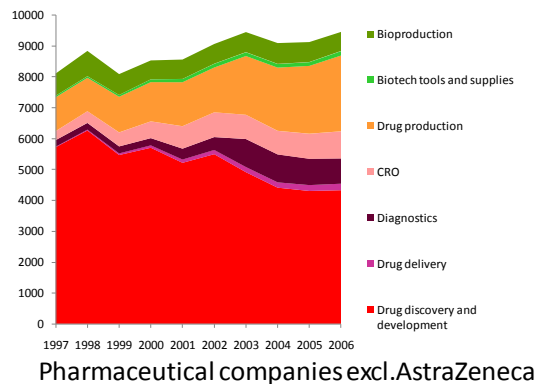
Decline

Over the ten-year period, about 80 companies ceased to have employees (according to what was known in 2007). However, the majority of these companies are still registered with the Swedish Companies Registration Office. Fifteen companies have gone through liquidation or bankruptcy, including Melacure, UmanGenomics and Virtual Genetics Laboratory. About 20 companies have merged with, or been acquired by other companies, such as Bioglan (W.Sonesson) and Cresco Ti Systems AB (Astra Tech) in 2002, Neopharma (Solvay Pharmaceuticals AB) in 2004, Carmetec AB (NNE) and Arexis (Biovitrum) in 2005, Pfizer Consumer Healthcare (Mc Neil) and Biacore (GE Healthcare Biosciences) in 2006 and recently Biolipox (Orexo). Medscand Medical AB moved its entire business to the US in 2005. In 2003, Siemens-Elema ceased to exist. One division was moved to the US, another

merged with Dräger and moved to Germany, and yet another division was sold to the Getinge group (Maquet Critical Care).

Most of the companies which ceased having employees during the period were firms with fewer than ten employees. Medical technology companies are underrepresented among the disappearing companies compared to biotechnology and pharmaceutical companies in relative terms. The pharmaceutical companies are overrepresented among the disappearing companies and the business segments of drug discovery and development and diagnostics have the highest relative shares of disappearances on a business segment level. Several business segments within medical technology have relatively low disappearance rates; for instance, aids for disabled people, electromedical and imaging equipment and medical disposables. Among the biotechnology business segments, biotech tools and supplies have a relatively low disappearance rate.

Turning to the activities of the disappearing companies, manufacturing and consulting are underrepresented whereas R&D is overrepresented. Apart from companies disappearing from the population of companies with employees, there are about 70 companies that have decreased their number of employees over the 1997-2006 period, half being medium-sized companies. Characteristic for the latter group is that the R&D-intensive companies are underrepresented relative to their share of the total population. The decreasing medium-sized companies also show a strong peak in the number of employees in year 2002.



Astra Group in Sweden

International and Swedish growth development

The Astra group includes AstraZeneca and AstraTech and their development in terms of the number of employees in Sweden is shown in the figure. AstraTech is a medical technology company classified into the business segment of active and non-active implantable devices. The company is also developing single-use products for the healthcare sector. AstraZeneca is classified as a pharmaceutical company and falls into the business segment of drug discovery and development. Strong growth at the end of the 90s and the first years of the 21st Century peaked in 2003. The numbers of employees declined between 2003-2006.

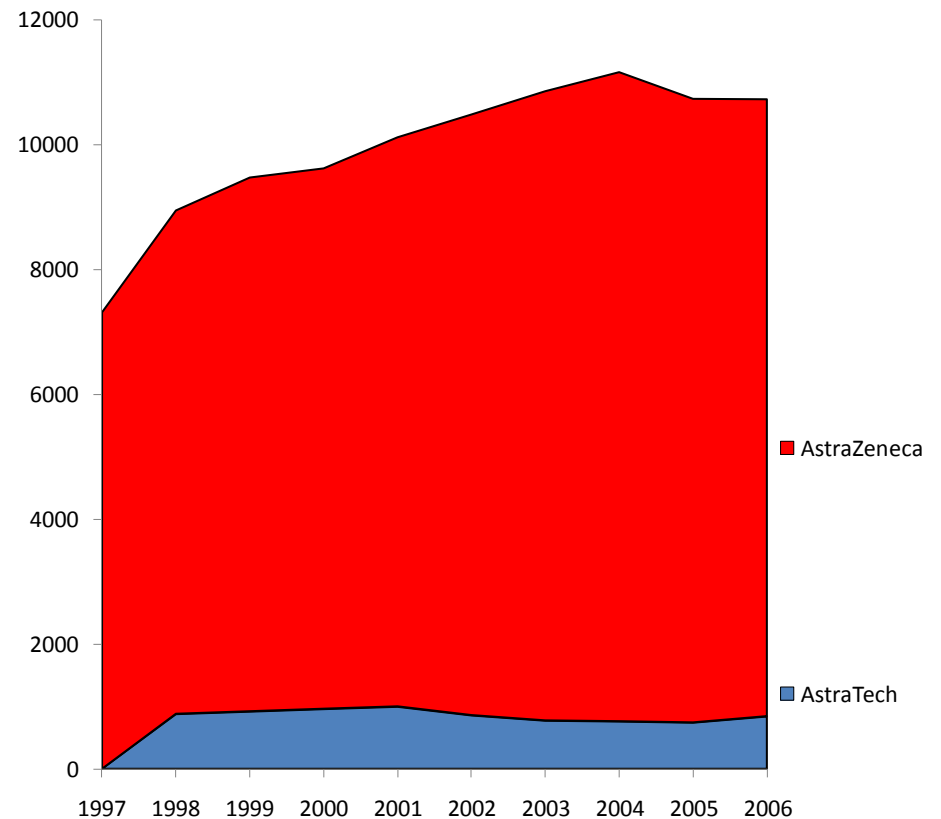
Since the merger of Swedish Astra and British Zeneca in 1999, several acquisitions and establishments have taken place. In 2000, research laboratories were opened in Boston USA, and the agrochemicals operation, formerly part of Zeneca, was hived off through the formation of Syngenta. In 2001, several development and manufacturing facilities were opened in the UK, a manufacturing plant was established in China and a controlling stake bought in Astra-IDL in India. AstraZeneca also sold its factory for pharmaceutical manufacturing of penicillin in Strängnäs to Recip. In 2002, a clinical research unit was opened in Shanghai and the wholly-owned AstraZeneca subsidiary Astra Pharmaceuticals acquired AstraZeneca Pharma Ltd in India. Concerning Sweden, there was an increased investment in the production facility in Södertälje. The investment in facilities and research establishments in the UK continued to expand between 2003-2007. There was also further investment in India in a new R&D facility and manufacturing facilities were established in France and Canada. AstraZeneca acquired KuDos Pharmaceuticals Ltd in 2005 and Cambridge Antibody Technology group plc in 2006. AstraTech acquired Cresto Ti Systems in 2005. In 2007, AstraZeneca acquired Arrow Therapeutics and MedImmune. Since the 1999 merger, AstraZeneca has made major investment in various locations in the UK. According to company press releases, a total of GBP 1 billion has been invested over the 1999-2006 period creating 550 scientific jobs.

The company is one of the world's leading pharmaceutical companies with products in six fields: oncology, cardiovascular, gastrointestinal, infection, neuroscience and respiratory and inflammation. In Sweden, research is being

conducted into respiratory, gastrointestinal and neuroscience in Södertälje, Mölndal and Lund.

The largest production unit in Sweden is Södertälje, but there is also production in Umeå. The head office is in London, but AstraZeneca's research and development headquarters is in Sweden.

AstraZeneca has no tradition of developing biopharmaceuticals but with the recent acquisition of the US-company MedImmune and Cambridge Antibody Technology, the pipeline broadened with biotechnology drugs. In 2007, AstraZeneca is seeking a buyer for its biotech facility in Södertälje, Sweden due to consolidating its biotech activities to the UK and USA.



Pharmacia-related companies in Sweden

1911: Pharmacia formed.

1995: Pharmacia merges with Upjohn to form *Pharmacia & Upjohn*. The company has approximately 7,000 employees in Sweden.

1996: Pharmacia Biosensor is sold and survives as *Biacore*.

1997: Pharmacia Biotech is merged with British company *Amersham* under the name *Amersham Pharmacia Biotech* which in 2001 is named *Amersham Biosciences*.

1997 Pharmacia has 5,250 employees.

1998: Pharmacia closes its research unit in Lund and major sections are purchased by *Active Biotech*.

The same year, German company *Fresenius* takes over the production of nutrient solutions which now operates under the name *Fresenius Kabi*.

1999: Pharmacia & Upjohn merge with Monsanto. The new group calls itself Pharmacia Corporation.

2001: Most of the remaining research within Pharmacia in Sweden is sold off and the new company *Biovitrum* is formed. Biovitrum subsequently sells the substitute plasma operation to Swiss company *Octapharma*. The same year, the clinical trials operation is purchased by American company *Quintiles*. In 2006 *iNovacia*, with 38 employees, was formed as a management buy-out from Biovitrum.

2002: *Pfizer* purchases Pharmacia.

2003: *Pfizer* sells *Pharmacia Diagnostics* to two venture capital companies. The companies created through the sale of Pharmacia's operation have 7,960 employees in the following companies: *Biacore*, *Fresenius Kabi*, *Biovitrum*, *Octapharma*, *Quintiles*, *Pfizer*, *Pharmacia Diagnostics AB* and *Active Biotech*.

2004: *Amersham Biosciences* is sold to the American company *General Electric Inc.* and named *GE Healthcare*.

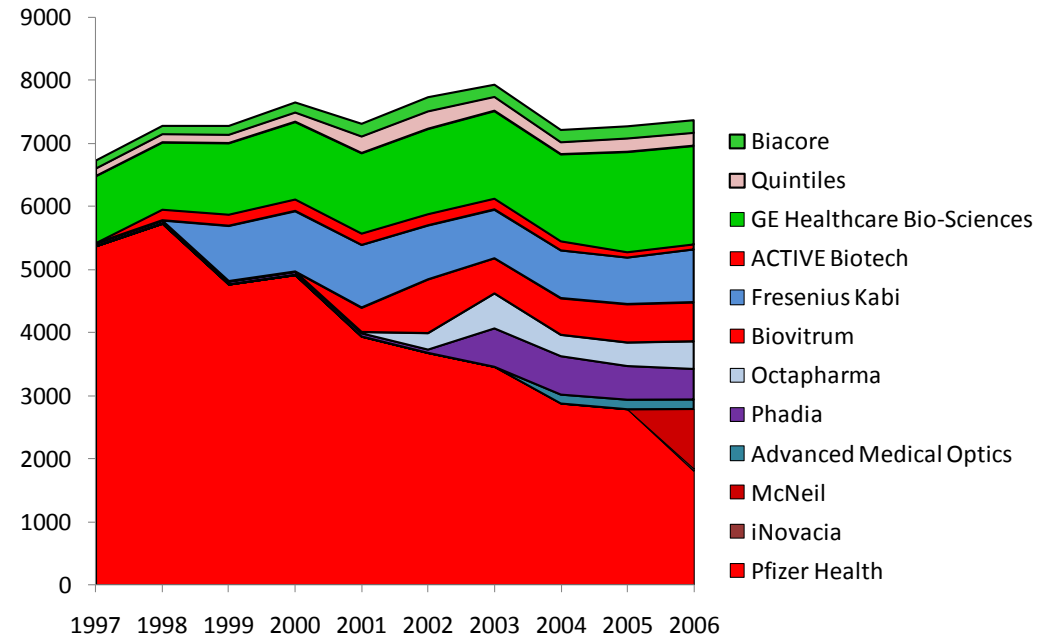
Since 2004:

Pfizer invests to increase the production capacity in the bioproduction plant in Strängnäs. Bangalore-based pharmaceutical company *Kemwell* has completed the acquisition of *Pfizer's* Salazopyrin manufacturing plant in Uppsala.

Advanced Medical Optics acquires the ophthalmic surgery operation and *Pfizer* has moved its Uppsala operation to Stockholm.

In 2006, the Helsingborg production unit (*Pfizer Consumer Healthcare*) manufacturing the *Nicorette* product family was sold to the *Johnson & Johnson* group to form the company *McNeil Sweden AB*. *Pfizer* is also closing down its production unit in Stockholm. Today, *Pfizer* has no research facility left in Sweden, only some development of aids for dosage and taking of drugs. However, there is collaboration on research with *Karolinska Institutet* amongst others.

Since 1995, the former Pharmacia operation has been sold to various owners and now comprises 12 companies. In the period 1997-2006, these companies jointly increased the number of employees by approximately 9.5%, corresponding to an increase by about 640 employees.



5. Development of production and relative results 1997 - 2006

To understand the economic development of a highly research-intensive and dynamic industry, it is interesting to trace the production and relative results development for the life science industry in the ten years 1997-2006. The production development is described as net turnover per employee, as well as productivity (value added per employee) and value added. The latter is described in order to indicate the life science industry's contribution to the Swedish GDP. The development of relative results is defined as the results after financial items divided by net turnover. Items affecting comparability have been addressed and are subtracted from the results after financial items, thus generating a relative result ratio linked to the core activity. The chosen business ratios show the development of the entire life science industry, as that industry's three sectors: pharmaceuticals, biotechnology and medical technology. Since the number of companies increases over the period, the net turnover of the different sub-sets of the life science population has also been calculated in relation to the total number of employees of that particular sub-set. The table below explains how the business ratios are defined and how they were generated.

Terminology used	Calculated according to:
Relative result	Σ (results after financial posts - items affecting comparability) / Σ net turnover
Net turnover / employee	Σ deflated net turnover / Σ employee
Value added	Σ deflated value added in absolute terms
Productivity	Σ deflated value added / Σ employee
ITPI (Price index for domestic supply)	1997 = 100
Medical technology sector	ITPI for medical, surgical and orthopaedic equipment, directly derived from Bolagsverket
The biotechnology and the pharmaceutical sector	ITPI for drugs and other pharmaceutical products, directly derived from Bolagsverket
The life science industry	$\left(\frac{\sum_{\text{Med tech companies}} \text{Net turnover all}}{\sum_{\text{Life science companies}} \text{Net turnover all}} \cdot \text{ITPI Medical products} \right) + \left(\frac{\sum_{\text{Med tech companies}} \text{Net turnover all non}}{\sum_{\text{Life science companies}} \text{Net turnover all}} \cdot \text{ITPI Pharma products} \right)$
Σ	All companies within the group of companies considered
Additional terminology used	Definitions
Financial posts	Revenue from interest - costs of interest = net interest income
	Dividend
	Capital gain
Items affecting comparability	Occurrences and transactions that are not extraordinary but may cause a problem when comparing different accounting periods. For instance, selling fixed capital assets.

The net turnover value of each company and year has been deflated. The biotechnology and pharmaceutical sector was deflated by ITPI (Price index for domestic supply) for drugs and other pharmaceutical products and the medical technology sector was deflated by ITPI for medical, surgical and orthopaedic products. An average of these ITPI deflators was used for the different life science industry sub-sets. This was weighted according to the relative volumes of medical and non-medical technology companies, relative to the total volume. By deflating the values, the effect of pricing inflation is taken into account. However, increased product quality could also be a reason for increased prices, but this has not been taken into account.

The figures illustrating the chosen business ratios follows in order of relative results¹, net turnover per employee, productivity and value added. The text, on the other hand, describes each sector starting with the entire life science industry and then describes the biotechnology, pharmaceutical and medical technology sectors.

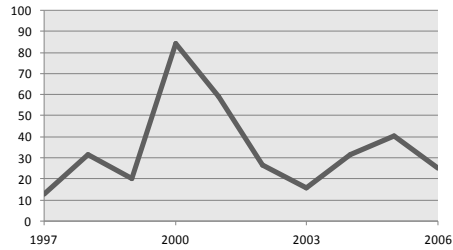
¹ The relative result of the Gambro group and AstraZeneca in 2000 and Gambro Lundia in 1997 are exceptionally high due to high results of associated companies. These results have not been accounted as items affecting comparability by the companies themselves. Therefore, their results after financial posts have not been adjusted in this respect, except for the result after financial posts of the Gambro. Their 2000-value was highly untypical compared to the other years within the ten year period and therefore an average of the preceding and following year has been used when generating the result after financial posts of the Gambro group.

Relative result (%)

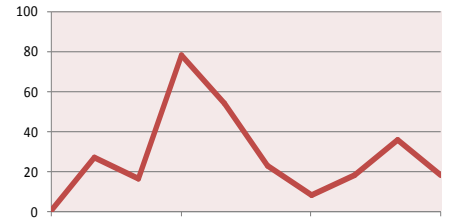
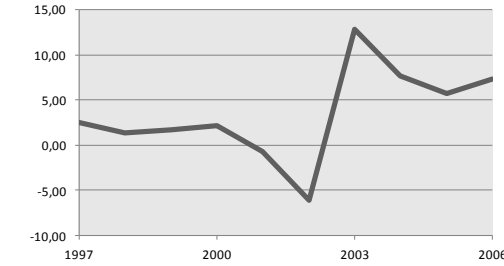
Large companies (>500employees) included

Large companies (>500employees) excluded

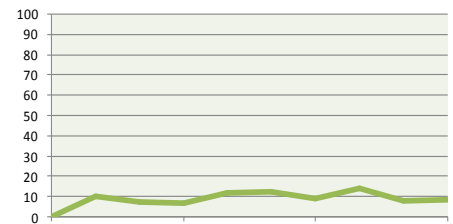
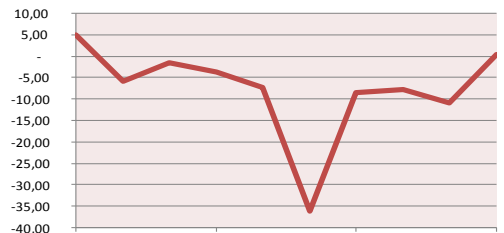
Development of R&D intensive and non-R&D intensive companies (large companies are included)



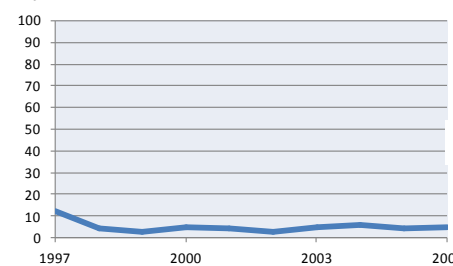
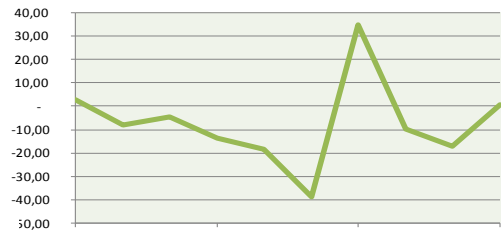
Life Science



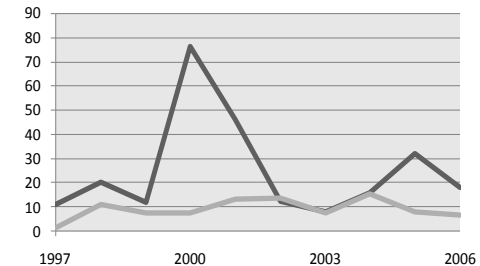
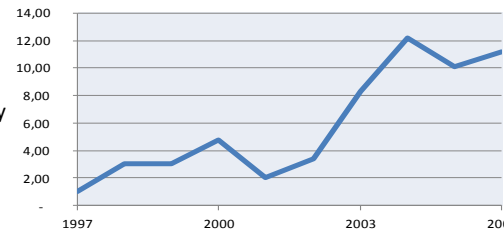
Pharmaceutical



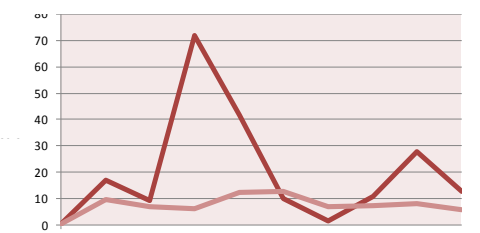
Biotechnology



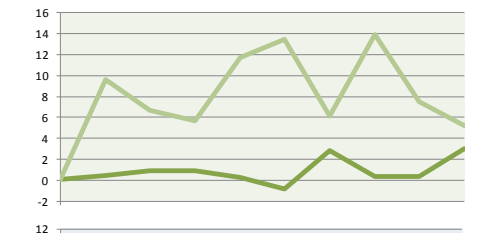
Medical technology



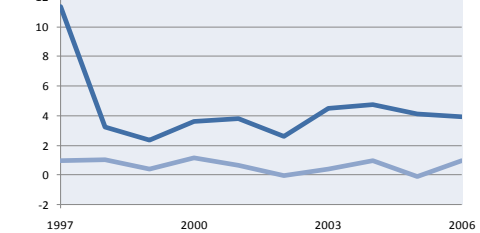
— R&D
— No R&D



— R&D
— No R&D



— R&D
— No R&D



— R&D
— No R&D

The life science industry

The development of the relative result (results after financial items relative to net turnover) of the life science industry has followed a bumpy road since 1997. There are three distinct peaks in the relative result development. Over the ten-year period, the relative results of the life science industry range from 10% to 60%. The relative result is lower when excluding larger companies. 2002 is generally known as a bad year on the stock market. This is also the case for the life science industry, particularly for the SMEs. The development for SMEs turned around and peaked in 2004, whereas the peak occurred in 2005 when larger companies are included. Including larger companies, the R&D-intensive companies have higher levels of relative results than non-R&D-intensive companies. However, the situation is reversed for the SMEs, which show negative results until 2003, with a large dip in 2002. In both populations, the fluctuations are significantly higher for R&D-intensive companies.

The net turnover per employee has increased over the ten-year period. The 2002 decline also appears in this data. The SMEs have had a lower increase until a few years ago. The R&D-intensive life science companies show a clear positive trend, whereas the non-R&D-intensive companies are more or less stagnated over the same period. Initially, in 1997, the R&D-intensive companies had much lower levels of net turnover per employee, but are now far ahead of the non-R&D-intensive companies. The former group has had a strong development particularly in the last years. The SMEs also show this kind of pattern. R&D-intensive companies started off at lower levels in 1997 than the non-R&D-intensive companies but caught up to almost the same level in 2006.

In absolute terms, the value added increases strongly over the period. This is also the case for productivity, indicating that the increase is not only a consequence of sector growth in terms of number of companies and employees. R&D-intensive companies show the strongest increase both in absolute and relative terms. Based on the productivity values for 1997-2006, an estimated average growth of productivity has been derived for the ten-year period and reaches almost 9%. For the entire life science industry, this value can be compared to the estimated average growth of all industries; 6.5%.

When calculating the ratio of value added in absolute terms for the life science industry relative to the GDP of all industries, this ratio is shown to have increased over the ten-year period, from approx. 10% to almost 25%. Thus, the development of the life science industry in terms of productivity turned out to be significantly stronger than for all industries in Sweden.

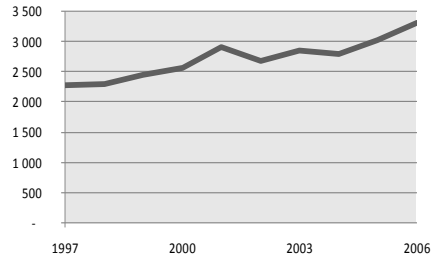
The biotechnology sector

The biotechnology sector is associated with volatility, at least on the stock market, which is in accordance with the fluctuations of the relative result of the biotech SMEs. The fluctuations of both medical technology and pharmaceutical SMEs are lower. Including larger companies, the relative results fluctuate moderately and the biotechnology sector shows a slightly increasing trend over the ten-year period. However, it is important to note that a decline has occurred since 2004. In 2006, there was only a weak increase compared to 2005. Nevertheless, biotech SMEs have had a substantial increase since 2005, but nowhere near *their* record year of 2003. The R&D-intensive SMEs fell to their lowest level of the ten-year period in 2002, coinciding with the stock market's lowest quotation for the biotechnology sector. The non-R&D-intensive SMEs were also affected but have shown positive relative results for the most part of the period. Including larger companies, the R&D-intensive biotech companies have grown to the same level of relative results as in 2003, constituting an exception to the other biotech sub-sets mentioned. However, the level of relative results for non-R&D-intensive biotech companies is significantly higher.

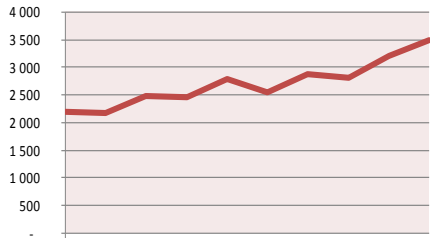
The net turnover per employee has increased since 1997. There was a peak in 2001 and a low point in 2003. The 2006 value exceeds the peak value. The R&D-intensive companies have not quite fully recovered to the 2001 peak value, whereas the non-R&D-intensive companies are far ahead of their highest peak value, which occurred in 2002 and was followed by a sharp decline in 2003. The R&D-intensive companies show a stronger increase over the ten-year period than the non-R&D-intensive companies.

Net turnover per employee (TSEK)

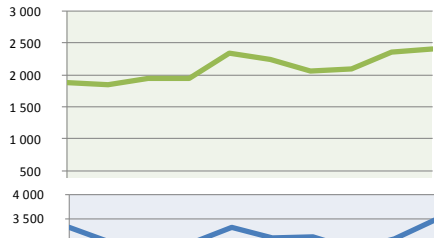
Large companies (>500 employees) included



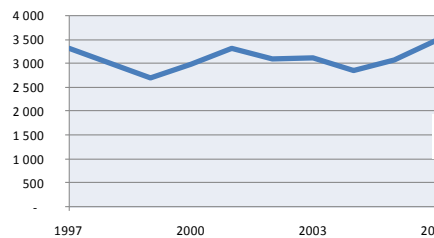
Life Science



Pharmaceutical

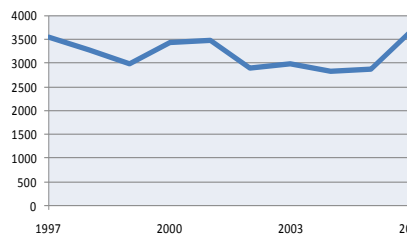
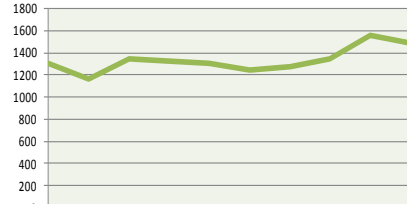
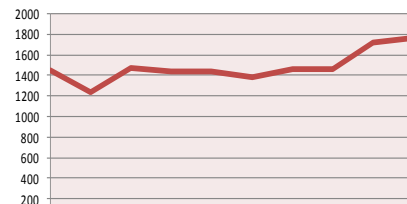
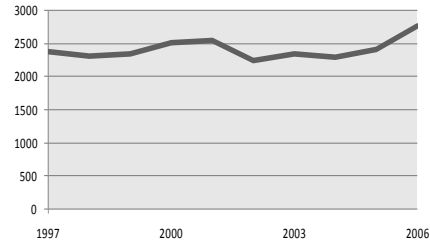


Biotechnology

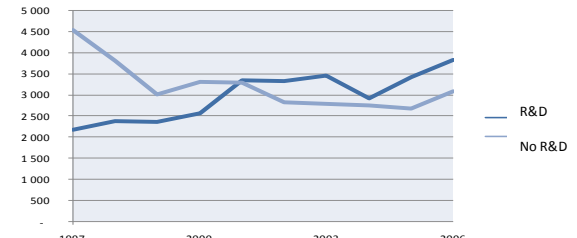
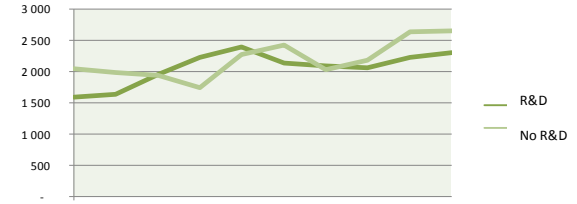
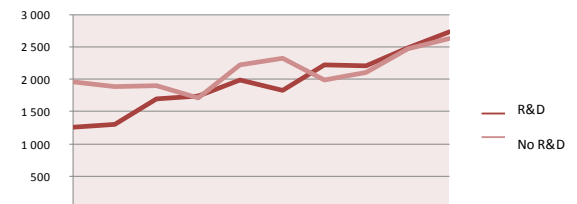
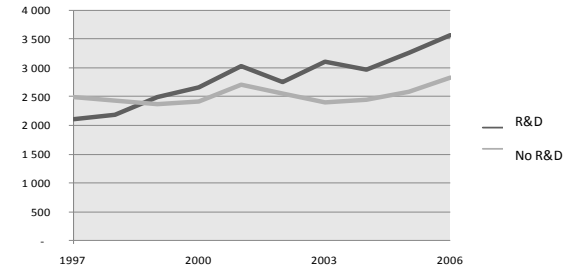


Medical technology

Large companies (>500 employees) excluded



Development of R&D intensive and non-R&D intensive companies (large companies are included)



The value added in absolute terms for the biotechnology sector has increased sequentially, with a peak in 2001 followed by a dip in 2002. The curve seems to level away from 2005. This is also the case for productivity. The R&D-intensive companies have caught up with the non-R&D-intensive companies in later years in terms of value added in absolute terms. This is not the case for productivity.²

The pharmaceutical sector

The development of the relative results of the pharmaceutical sector is strongly consistent with that of the entire life science sector, both in terms of the level of relative results and in time, when larger companies are included. This is due to the large impact of AstraZeneca. When considering the diagrams, it should be kept in mind that AstraZeneca has been categorised as an R&D-intensive company in this material. Turning to the SMEs, the pharmaceutical sector mainly presents negative results over the ten-year period. Just like the corresponding biotechnology population, they are largely overlapping company populations. The relative result of pharmaceutical SMEs fell drastically in 2002. Over the 2002-2006 period, both the R&D-intensive and non-R&D-intensive SME populations have increased. Including larger companies, there is a decline between 2005 and 2006 irrespective of R&D intensity, but all relative results are positive.

The pharmaceutical sector shows a strong development of net turnover per employee out of the three sectors considered. A low point occurred in 2002 but in the last years all the sectors have grown considerably in terms of net turnover per employee and in 2006 reached the highest level over the ten-year period. When excluding the larger companies, the levels are slightly lower over the period and the increase is not as strong. The R&D-intensive companies have had a stronger development than the non-R&D-intensive companies, just like the biotechnology sector. The 2006 value of the R&D-intensive companies is higher than the corresponding value of the non-R&D-intensive companies. However, the SMEs have had a different development. The overall development has been increasing but turning to the R&D-intensive companies, their values were higher at the beginning of the period.

² The value added of AstraZeneca in 2000 has been exchanged for an average of the preceding and following year due to a large deviation in the value added that year compared to the other years. This also concerns the pharmaceutical sector and the R&D intensive companies.

The pharmaceutical sector has had the largest increase in productivity among the three sectors. Both value added and productivity show a stronger increase for R&D-intensive companies than the non-R&D-intensive companies. In the later years, the value added in absolute terms and the value added per employee has shown a particularly strong development for R&D-intensive companies whilst both measures have declined for non-R&D-intensive companies.

The medical technology sector

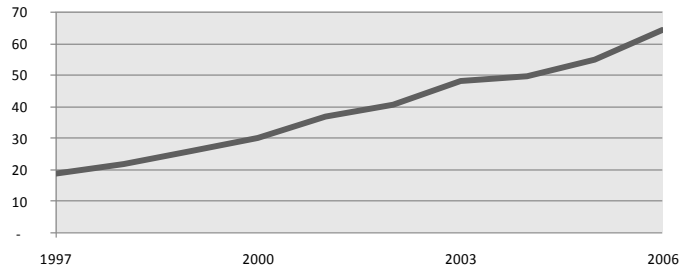
Compared to the pharmaceutical and biotechnology sectors, the medical technology sector fluctuates less and has had positive relative results. This, regardless of what sub-set of companies one chooses to look at in terms of R&D intensity and size of companies included. The medical technology sector shows higher results for R&D-intensive companies than non-R&D-intensive companies. This holds true both for SMEs and when larger companies are included. This sector, like the pharmaceutical sector, is characterised by a few larger companies such as the Getinge group, Phadia, Astra Tech, Gambro and Elekta. However, the development of SMEs strongly resembles that of the entire medical technology sector. One important exception is the results after financial items for Gambro in 2000, which has such a large impact on the overall result that particular year that it has been excluded from the data.

The net turnover of the medical technology sector has been on a high level since 1997 compared to the other sectors. The low point in 2003 has been more than recovered. It is interesting to note that the R&D-intensive companies had lower levels of net turnover per employee than non-R&D-intensive companies at the beginning of the period and that at the end of the period, the situation is reversed.

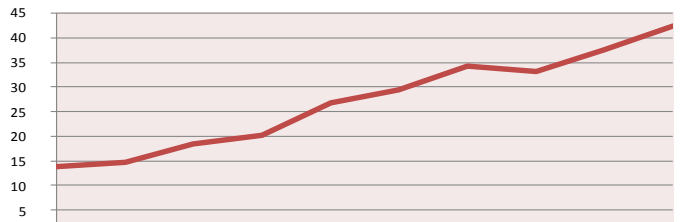
Both the value added in absolute terms and the productivity for medical technology are lower overall than for the other two sectors and the increase has not been quite as strong. The R&D-intensive and non-R&D-intensive companies started out on the same levels in 1997. The R&D-intensive companies are now significantly ahead.

Value added in absolute terms (BSEK)

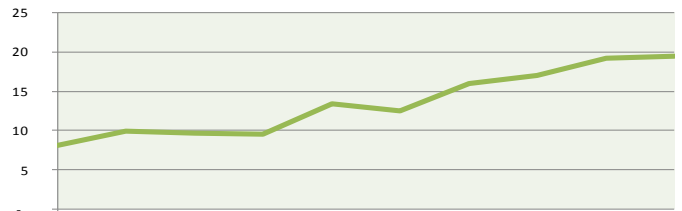
Large companies (>500 employees) included



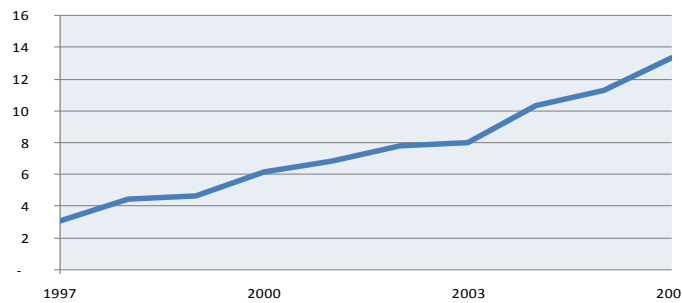
Life Science



Pharmaceutical



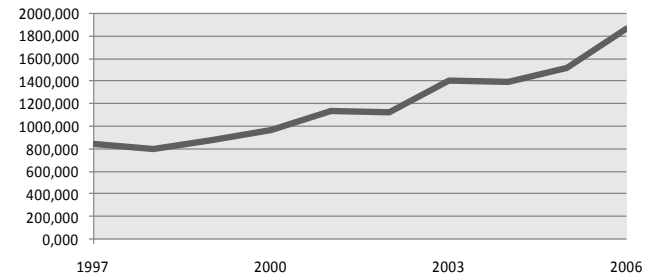
Biotechnology



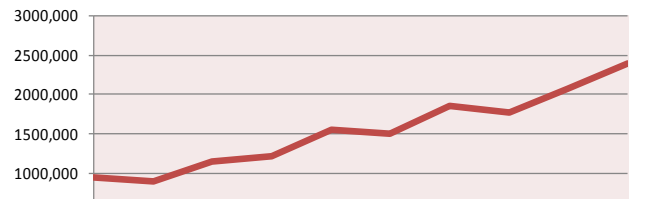
Medical technology

Value added per employee (TSEK)

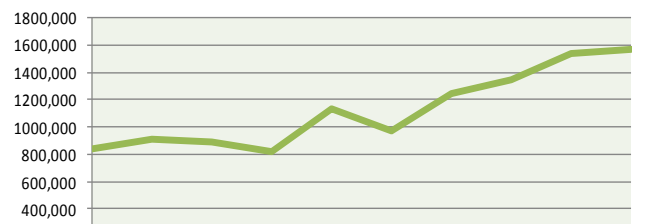
Large companies (>500 employees) included



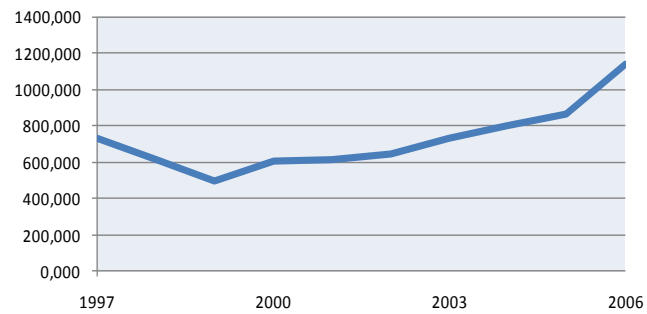
Life Science



Pharmaceutical



Biotechnology



Medical technology

6. Regional profiles

The most prominent life science regions have differing subject profiles:

Stockholm concentrates on drug discovery and development and has a strong presence of international pharmaceutical companies which also often localise their sales and marketing activities in clinical trial operations there.

Uppsala has several of the country's larger biotech tools and supplies companies, largely due to Pharmacia's previous activity in that region. Conversely, most new companies in this business segment have started up in Stockholm more recently, often as spin-offs from the Karolinska Institute and KTH.

Strängnäs has some large bioproduction plants and is shown in the diagrams as part of the Stockholm region.

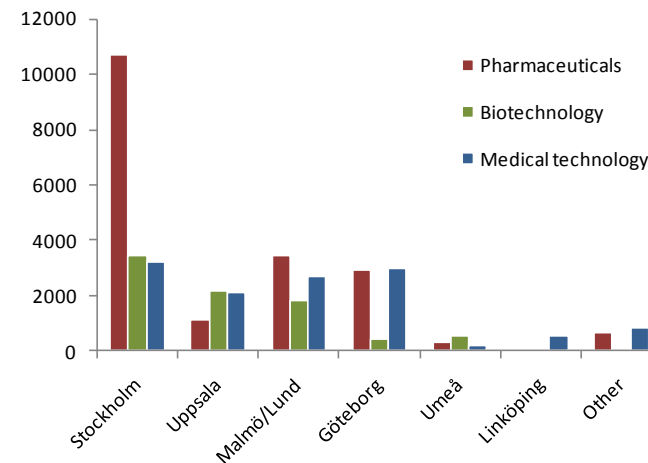
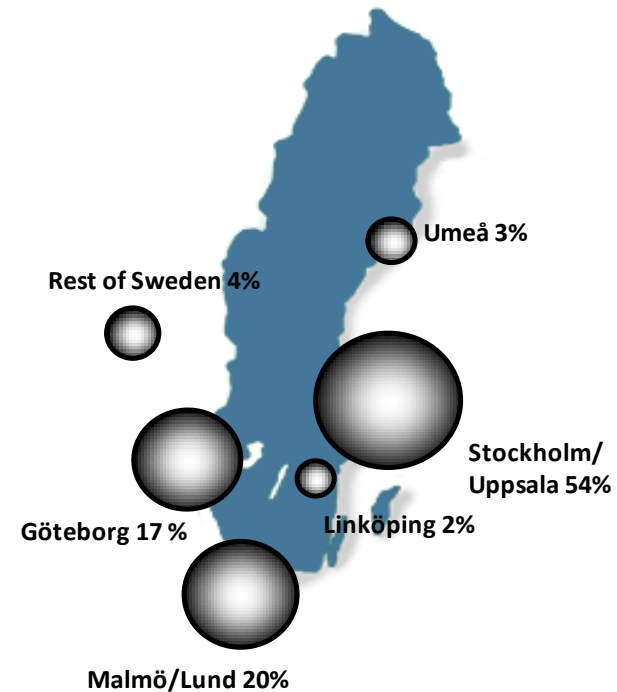
The Gothenburg area has AstraZeneca's largest research unit in Sweden, and several larger medical technology companies. They include several companies involved in the development of oral cavity titanium implants, limb prostheses and bone-anchored hearing aids. The Gothenburg region also has a large number of sales companies.

In Skåne, there are many people employed in medical technology. There are also companies in bioproduction, drug discovery and development and drug production, and agricultural biotechnology companies have a long tradition in the region. The small number of companies in food biotechnology, agricultural biotechnology and environmental biotechnology are mainly situated in Skåne.

For Östergötland, there are mainly companies in medical technology; some originating from Saab.

In Västerbotten, the larger companies are mainly involved in manufacturing, but there is also a small number of small research-intensive companies.

Few companies in the stated business segments are found outside the above regions and there are almost no research-intensive companies. However, there are some companies involved in product development and manufacturing.



7. List of companies

Drug discovery and development

> 250 employees

Biovitrum AB (publ)
McNeil Sweden
AstraZeneca AB

51 - 250 employees

Meda AB
Karo Bio AB
Medivir AB
ACTIVE Biotech AB/Active Biotech Research
Midelfart Sonesson/Vitamex Production AB

11 - 50 employees

InDex Diagnostics AB (publ)
AnaMar Medical AB
Betagenon AB
Oasmia Pharmaceutical AB
Cartela AB
Resistentia Pharmaceuticals AB
Swedish Orphan International AB
Tripep AB
NeuroNova AB
Abigo Medical AB
Cellartis AB
OxThera AB
NeuroSearch Sweden AB
iNovacia AB
WP Development AB

Biolipox AB
ACADIA Pharmaceuticals AB

1 - 10 employees

Carlab Läkemedelsforskning AB
Everygene AB
Nectin AB
Hansa Medical Utvecklings AB
Glycovisc Biotech AB
Cortendo Invest AB
Recopharma AB
Umecrine AB
Omnidea AB
OxyPharma AB
Atomos Drug Discovery Services AB
Swenora Biotech AB
Damavand Wound AB
DermaGen AB
Dextech Medical AB
Vironova AB
ACQ Medical AB
Moberg Derma AB
Umandiagnostics AB
Arcana Research AB
Allosergon AB
Bacilltech AB
E Holme Utveckling AB
Creative Peptides Sweden AB
New Pharma Research Sweden AB
Odeum Pharma AB
AngioGenetics Sweden AB
Lipopeptide AB
Dilafor AB
Glucox Biotech AB
ExThera AB
Pharmalink AB
Synphora AB

GotAGene AB
BioPhausia AB
Independent Pharmaceutica AB
Imed AB
Hamlet Pharma AB
Niconovum AB
Bioarctic Neuroscience AB
Avaris AB
PharmaSurgics in Sweden AB
Actar AB
Aprea AB
Diamyd Medical AB
Isconova AB
Innate Pharmaceuticals AB
Respiratorius AB (publ)

Drug delivery

11 - 50 employees

Magle AB
Zelmic Technologies AB
Lipocore AB
SHL Medical AB
Galenica AB
Camurus Development AB
Microdrug Development AB
Orexo AB

1 - 10 employees

Pharmatrix AB
Eurocine Vaccines AB
Isovent AB
Medinvent AB
Med Coat AB
Civo BioScreening AB
Hans Lennernäs Biomedical AB

Diagnostics

> 250 employees

HemoCue AB
Phadia AB/Allergon

51 - 250 employees

EuroDiagnostica AB
Sangtec Molecular Diagnostics AB
Biomet Cementing Technologies AB

11 - 50 employees

Bone Support AB
IDL Biotech AB
Chemotechnique MB Diagnostics AB
SvanovaBiotech AB
CanAg Diagnostics AB
Mercodia AB
Biodisk, AB

1 - 10 employees

Subcellulär Diagnostik i Stockholm AB
Biovator AB
Alimenta Diagnostics AB
Prolight Diagnostics AB
KalBiotech AB
Findout Diagnostic AB
Athera Biotechnologies AB
CytoGenomics Sverige AB
Velosense Biodiagnostics
NOSTER System AB
Gripping Heart AB
Vytal Diagnostics AB
IDEXX Scandinavia AB
Xi Bao Research AB
Servotek AB
LightUp Technologies AB
Zafena AB
LifeAssays AB (publ)

WIESLAB AB
Biopool AB
Boule Diagnostics International AB
Biovica AB
HistocenterSkandinaviskt Centrum för
Histoteknik AB
Bactus AB

Biotech medical technology

> 250 employees

QMed AB
Octapharma AB

51 - 250 employees

Vitrolife Sweden AB

11 - 50 employees

NidaCon International AB
Carmeda AB
Doxa AB
Olerup SSP AB
Glycorex Transplantation AB (publ)
Swemed Lab International AB
Ademrac AB
Bohus BioTech AB
Artimplant AB
CMA Microdialysis AB

1 - 10 employees

Svenska Miljöbolaget SVV AB
CytaCoat AB
SSP Primers AB
CellMatrix AB
Senzime Point of Care AB
Karocell Tissue Engineering AB
Celltrix AB
3H Biomedical AB
Ellen AB

CarbGraft AB
Corline Systems AB
BioPolymer Products of Sweden AB
Alteco Medical AB

CRO companies

51 - 250 employees

PPD Scandinavia AB
TFS Trial Form Support International AB
BioInvent International AB
Quintiles AB +quintiles services

11 - 50 employees

Jöns Jacob Berzelius Clinical Research Center AB
Statisticon AB
Smerud Medical Research Sweden AB
N D A Regulatory Service AB
Parexel Sweden AB
IRWConsulting AB
SEDOC Pharmaceutical Medicine AB
Nordic Management of Clinical Trials (NMCT) AB
SIDEK Technologies AB
Scandinavian CRI AB
Clinical Data Care in Lund AB
A+ Science AB

1 - 10 employees

Fyzikon AB
Cardiocon AB
Slaug Data Management AB
Monitour AB
Elevate Nordic AB
Crystal Research AB
neXyte AB
Hylae Clinical Research AB
Porten Pharmaceutical AB

Connector Medical AB
Cyncron AB
Venaticus AB
InNetics AB
Chiltern International AB
Assist Medical Sweden AB
Umbilicus Nordica AB
Orphan Europe Nordic AB
ARA Life Science AB
Colloidal Resource AB
Biognos AB
Saromics AB
Biognos AB
Öresund Diabetes Team AB
Omnicare Clinical Research AB
Dynamic Code AB
Acure Pharma AB
Biocontactor AB
Northern Sweden Clinical Research Institute AB
Visionar Biomedical AB
TATAA Biocenter AB
Genizon Svenska AB
Q Advance Compliance & Validation AB
Imagnia AB
Scandinavian Regulatory Services AB
Encorium Sweden AB
Pharma Consulting Group in Uppsala AB
Stricent AB

Drug production

> 250 employees

Apoteket
Cambrex Karlskoga AB
Recip

51 - 250 employees

Unimedic AB
QPharma AB

Cerbo, AB
CCS, Clean Chemical Sweden AB
SBL Vaccin AB
Kemwell AB

11 - 50 anställda

Synthelec AB
ACO Hud AB
Syntagon AB
Carmel Pharma AB
Bioglan AB

1 - 10 employees

Hebi Health Care AB
Tremedic AB
Biosafe AB
M&D Packaging AB
Metina AB
MGlas Scandinavia AB
BioTekPro AB
Chemilia AB
IsoSep AB

Biotech tools and supplies

> 250 employees

GE Healthcare Bio-Sciences AB

51 - 250 employees

Norada Holding AB
Biotage AB
GE Healthcare AB/GE medical/GE information
Biacore AB

11 - 50 employees

Ludesi AB
Q-Sense AB
Suollovaara Invest AB
Attana AB
Cellecricon AB

MIP Technologies AB
Biosensor Applications Sweden AB
Alligator Bioscience AB
Gyros AB
Affibody AB

1 - 10 employees

Percell Biolytica AB
Inovata AB
NOVAFERM AB
Biodev
Quintessence Research AB QRAB
PH Plate Microplate Techniques AB
Perbio Science AB
Senset AB
ModPro AB
Layerlab AB
Genordia AB
European Institute of Science AB
John Curling Consulting AB
Magnetic Biosolutions Sweden AB
Omnio AB
BioChromix AB
Layerlab AB
SymCel AB
Oligovation
Chemel AB (publ)
Biopix AB
Absorber AB
Proteramed AB/Medicwave
Belach Bioteknik AB
Peviva AB
Genovis AB
Alphahelix AB
Biothema AB
CyberGene AB
NANOxIS AB
Midorion AB
Olink AB
Mitronics AB

Bioproduction

> 250 employees

Pfizer Health AB /Pfizer AB

11 - 50 employees

Novozymes Biopharma AB
DSM AntiInfectives Sweden AB
Polypeptide Laboratories (Sweden) AB
Ferring AB

1 - 10 employees

Inro Biomedtek AB
Syn Biotech AB
Medisera AB
Ombitec AB
Immun System I.M.S. AB
TdB Consultancy AB
Atlas Antibodies AB
Ova Production AB
Innovagen AB
Mabtech AB
Protista Fermentation AB
BioReal AB
Medicago AB
Agrisera AB
Scandinavian Gene Synthesis AB
ViraNative AB

Agricultural biotechnology

51 - 250 employees

Svalöf Weibull AB
Syngenta Seeds International AB
Lantmännen BioAgri AB

11 - 50 employees

Maselaboratorierna AB
SweTree Technologies AB

Plant Science Sweden AB

1 - 10 employees

BINAB BioInnovation AB
Nya Bionema AB

Environmental biotechnology

11 - 50 employees

Invekta Green AB
AnoxKaldnes Global AB (publ)

1 - 10 employees

Alron Chemical Co AB
Biobact AB
Sysav Utveckling AB
BioHygien i Sverige AB
Ekologisk Teknologi i Skellefteå AB

Food-related biotechnology

11 - 50 employees

LTP Lipid Technologies Provider AB
PROBI AB
Husdjur AB
Cernelle., AB
Kemikalia AB
BioGaia AB
Medipharm AB

1 - 10 employees

Wasa Medicals AB
CeLac Sweden AB
Aventure AB
LabRobot Products AB
Indevex Marketing & Support AB
Essum AB

Biokraft Pharma AB
Biolac AB

Industrial biotechnology

1 - 10 employees

Xylophane AB
Appartex AB

Healthcare equipment

51 - 250 employees

Liko Textil AB
Arjo Förvaltnings AB

11 - 50 employees

Olmed Operation AB
Human Care HC Lifts AB
Ross Medical Equipment, Romedic AB
Oscar Instrument AB
Söndrums Svets & Mekaniska AB
Conroy Production AB
Närkes Vital AB
Proton Caretec AB
Sjöbloms Sjukvårdsutrustning AB

1 - 10 employees

Skärmteknik Svenska AB
Caresia AB
Luki AB
TOUL Meditech AB
AO Medical Products Sweden AB
Reison Medical AB
Vegoria Produktion AB
Rini Ergoteknik AB
Care of Sweden AB
Remeda AB

Active and non-active implantable devices

> 250 employees

Nobel Biocare AB
Astra Tech AB
Astra Tech AB
St. Jude Medical AB

51 - 250 employees

Entific Medical Systems AB
Elos Medical AB
Atos Medical AB

11 - 50 employees

Swemac Orthopaedics AB
BioMain AB
Straumann AB

1 - 10 employees

Immuno AB
P & B Research AB
Rickard Brånemark Consulting AB
Encecor AB
Tigran Technologies AB (publ)
SMM Medical AB
Cad.esthetics AB
Craniofacial Reconstruction TA AB
Integrum AB
Brånemark Center Göteborg AB
Limedic AB
Vitatron Sweden AB
Integration Diagnostics AB
Osspol AB

Anesthetic/Respiratory equipment

51 - 250 employees

Maquet Critical Care AB
Breas Medical AB

11 - 50 employees

Anmedic AB
Artema Medical AB
Instrumentarium AB
OTRE AB
PhaseIn AB
Aerocrine AB

1 - 10 employees

Medimek AB
Clinova Medical Innovation Dr Per Ljungvall AB
Optovent AB
Rium Medical AB
Airsonett AB
Sedana Medical AB
MedAir AB (publ).
Aspira Medical AB

Dental devices

11 - 50 employees

Athena Nordic AB
Directa AB
Belas AB
Nordiska Dental AB
Amdent AB
Biora AB
Dentatus AB
Dentac Dentalprodukter AB

1 - 10 employees

Linden Dental Products AB
Dental in Sweden AB
Titanteknik J&F AB
CleanDent Sweden AB
Dendema AB
Mirrodent AB
Sendoline AB
Dentagon AB
Ceramic Instrument AB
OraSolv AB
Depro, AB
Wingen Dental AB
Swedish Dental Supplies AB
Turon MedTech AB
Svenska Dentorama AB
Dental Therapeutics AB
FriadentScandinavia AB
J.H. Orsing AB
Ardent, AB

Electromedical and imaging equipment

> 250 employees

Gambro Lundia AB

51 - 250 employees

Boule Medical AB
Arcoma AB
Getinge Sverige AB
GEMS PET Systems AB
Radi Medical Systems AB
Elekta Instrument AB
Getinge Disinfection AB
Sectra Skandinavien AB

11 - 50 employees

Ultrazonix DNT AB

Nuclear Diagnostics AB
Getinge AB
ONCOlog Medical QA AB
C-Rad Imaging AB
Jolife AB
ProstaLund Operations AB
Neoventa Medical AB
XCounter AB
Medeto Medical Device Technology AB
Rti Electronics AB
ContextVision AB
Aiolos Systems AB
CellaVision AB
Scanditronix Wellhöfer AB
Perimed AB
Unfors Instruments AB
Cefar Medical AB
Ortivus AB
Uppsala Imanet AB

1 - 10 employees

Comair professor Hans Wiksell AB
Victrix AB
Tilly Medical Products AB
Studsvik Medical AB
Aditus Medical AB
Pencilbeam Technologies AB
R.E.D. Develop AB
NovoSense AB
Medfield Diagnostics AB
Neoventor Medicinsk Innovation AB
Somedic Production AB
TL EltromedicinAB
Demetech AB
Ljungberg & Kögel AB
Mobile Intensive Care Unit Sweden MICUS AB
Octapump AB
MedicPen AB (publ)
SACS Medical Göteborg AB
Arbexa

PBM Stressmedicine Systems AB
VibroSenseDynamics
ObsteCare AB
Hök Instrument AB
DTec AB
Breis & Co AB
Ceram AB
Medtentia AB
Medical Vision Research & Development AB
Micropos Medical AB
VibraTech AB
SchizoDetect AB
Medivet Scandinavian AB
Entomed AB
EveryMed AB
Octacare AB
Medical Photo Bio Care Sweden AB
RSA Biomedical AB
Somedic Sales AB
Biolight International AB
Xenodevice AB
Quickels Systems AB
ErySave AB
Micromuscle AB
SpectraCure AB
Ingenjörfirman Björn Bergdahl AB
Samba Sensors AB
Krucom AB
Medirox AB
qbTech AB
Triacon Scientific AB
SWEMAC Medical Appliances AB
SciBase AB

Ophthalmic devices

51 - 250 employees

Advanced Medical Optics Uppsala AB

1 - 10 employees

PhacoTreat AB
UDesign Ögonkonsult AB
Lynn AB

Surgical instruments and supplies for electromedical and imaging applications

11 - 50 employees

Millicore AB
Getinge Skärhamn AB
Stille Surgical AB

1 - 10 employees

Corisco AB
Ortoma AB
Dignitana AB
CID Cardiovascular Innovation Design AB
Quickcool AB
Wennbergs Finmek AB
Ursus Konsult AB
Ascendia MedTech AB
Eskilstuna Instrumentverkstad AB
Microbiotech/se AB
Plasma Surgical Svenska AB
Spectro Analytic Irradia AB
Gridline AB

Medical disposables

> 250 employees

Mölnlycke Health Care AB
PaperPak Sweden AB
Becton Dickinson Infusion Therapy AB
Cederroth International AB
Fresenius Kabi AB
Promech Lab AB

51 - 250 employees

AKLA AB
NovAseptic AB
Medical Rubber M.R. AB

11 - 50 employees

Bactiguard AB
Bio-Hospital AB
Axiom Sjukvårdsprodukter AB
Inmedic AB
Hammarplast Industri AB
Cellcomb AB
Flexmed AB
Cenova Innovation & Produktion AB
Orifice Medical AB

1 - 10 employees

Calmar Medical AB
Pomidor AB
Absorb-Plus AB
Calmed AB
T A Contrast AB
Jägstens Sjukvårdsprodukter AB
ENTpro AB
Kaltoplast, AB
Optima Scandinavia AB

Bruce Medical AB
Item Development AB
Pharma Systems PS AB
SaniCare AB
Pharma systems sweden AB
HaeMedic Sweden AB
Doft AB
Trollhätteplast AB
Rolf Kullgren AB

CRO medtech**> 250 employees**

Kronans Droghandel ADB AB

11 - 50 employees

Cross Technology Solutions AB

IT and training**51 - 250 employees**

Cambio Healthcare Systems AB
Ims Medical Radar

11 - 50 employees

Carelink AB

ECARE AB
Medidoc AB
Cogmed Sverige AB
RaySearch Medical AB
Systeam Udac AB
Mentice AB
Profdoc AB

1 - 10 employees

Inovacor AB
Distributed Medical Sverige AB
Bäwer & Nilsson AB
RGB Technologies AB
Comai
Meditalk AB
G4 It AB
Ceterum AB
Melerit AB
Zenicor Medical Systems AB
Bergsjö Data AB
InternetMedicin i Göteborg AB
Surgical Science Sweden AB
Reachin Technogis AB
WeAidU in Europe AB
Provisio AB

Tables

		Broad R&D, prod on market	Broad R&D, no prod on market	Narrow R&D, prod on market	Narrow R&D, no prod on market	Product development	Consulting	Manufacturing	TOTAL
Total	Companies	99	8	110	65	151	73	111	617
Total	Employees	13985	129	800	287	4020	1404	13843	34468
Pharmaceuticals	Companies	33	8	31	39	14	58	46	229
Pharmaceuticals	Employees	7757	129	201	127	542	942	9776	19474
Biotechnology	Companies	54	8	71	46	21	18	33	251
Biotechnology	Employees	3614	129	581	206	782	102	3517	8931
Medical technology	Companies	48	0	59	28	132	5	54	326
Medical technology	Employees	4844	0	406	97	3471	394	3072	12284

Distribution of companies and employees according to activity category

		Drug discovery and development	Drug delivery	Diagnostics	Biotech medical technology	CRO	Drug production	Biotech tools and supplies	Bioproduction	Agricultural biotechnology	Environmental biotechnology	Food-related biotechnology	Industrial biotechnology	Healthcare equipment	Active and non-active implantable devices	Anaesthetic/Respiratory equipment	Dental devices	Electromedical and imaging equipment	Ophthalmic devices	Surgical instruments and supplies for electromedical	Medical disposables	CRO medtech	IT and training	Total	
Total	Companies	87	16	39	26	57	29	49	19	8	7	15	2	22	23	17	27	91	4	16	34	3	26	617	
Total	Employees	14233	227	1232	1134	907	2489	2291	854	529	60	199	7	523	2338	600	240	2813	157	115	2758	401	362	34468	
Pharmaceuticals	Companies	87	16	30	0	50	29	0	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	229
Pharmaceuticals	Employees	14233	227	826	0	860	2489	0	839	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19474
Biotechnology	Companies	73	9	29	25	14	1	49	19	8	7	15	2	0	0	0	0	0	0	0	0	0	0	0	251
Biotechnology	Employees	3157	103	491	1122	79	39	2291	854	529	60	199	7	0	0	0	0	0	0	0	0	0	0	0	8931
Medical technology	Companies	0	0	39	26	0	0	0	0	0	0	0	0	22	23	17	26	91	4	16	33	3	26	326	
Medical technology	Employees	0	0	1232	1134	0	0	0	0	0	0	0	0	523	2338	600	205	2813	157	115	2404	401	362	12284	

Distribution of companies and employees according to business segment

	Employees					Companies				
	<10	11-50	51-250	251-	Total	<10	11-50	51-250	251-	Total
Pharmaceuticals	4%	7%	11%	78%	100%	61%	25%	10%	4%	100%
Biotechnology	5%	17%	22%	56%	100%	64%	25%	8%	3%	100%
Medical technology	5%	15%	22%	58%	100%	49%	20%	28%	4%	100%
Life science Total	4%	11%	20%	65%	100%	59%	25%	10%	5%	100%

Distribution of companies and employees according to company size

Sources

This study was based on the database built up within the framework of past VINNOVA reports in this field (VINNOVA Report: VINNOVA Analysis VA 2003:2, VINNOVA Report:VA 2005:2), regional input and also input from University holding companies, Innovationsbron AB, Venture Capital firms as well as VINNOVA, NUTEK and EU regarding companies having received funding.

The data was supplemented by drawing on data lists for companies with NACE codes 244, 331, 73103 and 51460 from the Market Manager Partners database. Concerning companies identified by an NACE code, only those with at least one employee were categorised. In total, approx. 1,800 companies were categorised within the framework of this study. The categorisation of companies was made based on information from the companies' websites, other information on the Internet, patent applications, various studies and analyses on companies within the field and telephone conversations with some of the companies included. Information about the number of employees of each company, the year of establishment, the structure of groups of companies as well as the economic information was extracted from the consultancy firm Market Manager Partners' (MMP) database. The MMP database is based on information registered at the Swedish Companies Registration Office. In order to generate business ratios for 2006, the data has been completed with information from Upplysningscentralen.

Biotech definition

OECD biotechnology definition:

The application of science and technology to living organisms as well as parts, products and models thereof, to alter living or non-living materials for the production of knowledge, goods and services

OECD list-based definition of biotechnology techniques:

DNA/RNA: Genomics, pharmacogenomics, gene probes, genetic engineering, DNA/RNA sequencing/synthesis/amplification, gene expression profiling, and use of antisense technology.

Proteins and other molecules: Sequencing/synthesis/engineering of proteins and peptides (including large molecule hormones); improved delivery methods for large molecule drugs; proteomics, protein isolation and purification, signalling, identification of cell receptors.

Cell and tissue culture and engineering: Cell/tissue culture, tissue engineering (including tissue scaffolds and biomedical engineering), cellular fusion, vaccine/immune stimulants, embryo manipulation.

Process biotechnology techniques: Fermentation using bioreactors, bioprocessing, bioleaching, biopulping, biobleaching, biodesulphurisation, bioremediation, biofiltration and phytoremediation.

Gene and RNA vectors: Gene therapy, viral vectors.

Bioinformatics: Construction of databases on genomes, protein sequences; modelling complex biological processes, including systems biology.

Nanobiotechnology: Applies the tools and processes of nano/microfabrication to build devices for studying biosystems and applications in drug delivery, diagnostics etc.

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December 2007

See www.VINNOVA.se for more information

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- VA 2007:
- 01 Nanoteknikens innovationssystem
 - 02 Användningsdriven utveckling av IT i arbetslivet - Effektvärdering av tjugo års forskning och utveckling kring arbetslivets användning av IT. *For brief version in Swedish and English see VA 2007:03 and VA 2007:13*
 - 03 Sammanfattning - Användningsdriven utveckling av IT i arbetslivet - Effektvärdering av tjugo års forskning och utveckling kring arbetslivets användning av IT. *Brief version of VA 2007:02, for brief version in English see VA 2007:13*
 - 04 National and regional cluster profiles - Companies in biotechnology, pharmaceuticals and medical technology in Sweden 2004. *Only available as PDF. For Swedish version see VA 2005:02*
 - 05 Nationella och regionala klusterprofiler - Företag inom fordonsindustrin i Sverige 2006
 - 06 Behovsmotiverade forskningsprogram i sektoriella innovationssystem. *For English version see VA 2007:15*
 - 07 Effekter av den svenska trafikskilkerhetsförakningen 1971-2004. *For brief version in Swedish and English see VA 2007:08 and VA 2007:09*
 - 08 Sammanfattning - Effekter av den svenska trafikskilkerhetsförakningen 1971-2004. *Brief version of VA 2007:07, for brief version in English see VA 2007:09*
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 - 11 Svenskt deltagande i sjätte ramprogrammet. *Only available as PDF*
 - 12 The role of Industrial Research Institutes in the National Innovation System
 - 13 Summary - User-driven development of IT in working life - Evaluating the effect of research and development on the use of information technology in working life. *Brief version of VA 2007:02, for brief version in Swedish see*
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 - 15 Needs-driven R&D programmes in sectorial innovation systems. *For Swedish version see VA 2007:06*
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 - 03 Innovationsinriktad samverkan. *Only available as PDF*
 - 04 Teknikbaserat nyföretagande i Sverige 1990 - 2003. *Only available as PDF*
 - 05 Offentligt stöd till universitetens samverkansuppgift - en internationell kartläggning. *Only available as PDF*
 - 06 Inkubatorer i Sverige - analys av indikatordimensioner och nyttoeffektivitet. *Only available as PDF*
- VA 2005:
- 01 Wood Manufacture - the innovation system that beats the system. *For Swedish version see VA 2004:02*
 - 02 Nationella och regionala klusterprofiler - Företag inom bioteknik, läkemedel och medicinsk teknik i Sverige 2004. *For English version see VA 2007:04*
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 - 04 Effektanalys av nackskadeforskningen vid Chalmers - Sammanfattning. *Brief version of VA 2004:07, for brief version in English see VA 2005:05*
 - 05 Impacts of neck injuries research at Chalmers University of Technology - Summary. *Brief version of VA 2004:07, for brief version in Swedish see VA 2005:04*
 - 06 Forskningsverksamhet inom produktframtagning i Sverige - en ögonblicksbild år 2004
 - 07 En lärande innovationspolitik - samordning och samverkan? *For English version see VA 2006:01*
 - 08 Svensk trafikskilkerhetsforskning i tätposition - Framträdande forskare

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 - 02 Tillväxtgenröven - affärsinnovation i svenska tjänsteföretag (*Innovation policy in Focus*)

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 - 02 MERA-programmet - Projektkatalog. *For English version see VI 2007:03*
 - 03 The MERA-program - Projects. *For Swedish version see VI 2007:02*
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 - 05 IT för sjukvård i hemmet - Projektkatalog. *For English version see VI 2007:13*
 - 06 VINNVÄXT - Ett program som sätter fart på Sverige! *For English version see VI 2007:09*
 - 07 Årsredovisning 2006
 - 08 Het forskning och innovationskraft - VINNOVA 2006. *For English version see VI 2007:10*
 - 09 VINNVÄXT - A programme to get Sweden moving! *For Swedish version see VI 2007:06*
 - 10 Red-hot research and innovation power - VINNOVA 2006. *For Swedish version see VI 2007:08*
 - 11 Research and innovation for sustainable growth. *For Swedish version see VI 2006:20*
 - 12 Projektkatalog - Genusperspektiv på innovationssystem och jämställdhet. Forsknings- & utvecklingsprojekt för hållbar tillväxt
 - 13 Under production. IT in Home Health Care. *For Swedish version see VI 2007:05*
 - 14 VINN Excellence Center
- VI 2006:
- 01 VINNOVA's verksamhet inom Transporter. *For English version see VI*

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- 02 Årsredovisning 2005
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 - 14 Arbetslivsutveckling - VINNOVA's satsningar inom arbetslivsområdet
 - 16 Competence Centres in Figures - Kompetenscentrum i siffror
 - 17 E-tjänster i offentlig verksamhet. *For English version see VI 2006:18*
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 - 04 DYNAMO - Beskrivningar av de 18 projekt som ingår i programmet
 - 05 Den dubbla vinsten. VINNOVA 2004
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 - 09 Kunskapsbildning och organisering - Ett program för förnyelse och innovation
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 - 02 Forskningsstrategi för miljöteknik - Redovisning av regeringsuppdrag till Formas och VINNOVA. *Only available as PDF*
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 - 02 Strategi för tillväxt - Bioteknik, en livsviktig industri i Sverige
 - 03 Knowledge to safeguard security. Proposals for a national strategy for security research. *For Swedish version see VP 2005:01*
 - 04 Produktionsteknik & Fordonstelematik. Förslag till FoU-program
 - 05 VINNOVA's views on the European Commission's proposal for the Seventh Framework Programme on Research & Technological Development 2007 - 2013. Position paper

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 - 02 Structural Funds as instrument to promote Innovation - Theories and practices. *Only available as PDF*
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 - 04 VINNVÄXTS avtryck i svenska regioner - Slutrapport. *For English version see VR 2007:06*
 - 05 Utvärdering VINNVINN Initiativet
 - 06 Effects of VINNVÄXT in Swedish regions - Final report. *For Swedish version see VR 2007:04*
 - 07 Industry report on exhaust particle measurement - a work within the EMIR1 project. *Only available as PDF*
 - 08 Swedish innovation journalism fellowships - en utvärdering. *Only available as PDF*
 - 09 Rörlighet för ett dynamiskt arbetsliv - Lärdomar från Dynamoprogrammet
 - 10 Miljöbilar och biodrivmedel - Hur påverkas Sverige av EU's direktiv?
 - 11 Evaluation report by the VINNVÄXT International Review Team.
 - 12 DYNAMO Arbetsgivarvård för ökad rörlighet - En slututvärdering av projekt om arbetsgivarvård inom DYNAMO-programmet
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 - 04 Framtidens e-förvaltning. Scenarier 2016. *For English version see VR 2006:11*
 - 05 Elderly Healthcare, Collaboration and ICT - enabling the Benefits of an enabling Technology. *Only available as PDF*
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 - 12 Om rörlighet - DYNAMO-programmets seminarium 12 - 13 juni 2006
 - 13 IP-telefoni - En studie av den svenska privatmarknaden ur konsument- & operatörsperspektiv
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 - 16 Utvärdering av forskningsprogrammet Wood Design And Technology - WDAT
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- 15 Värdeskapande innovationsmiljöer