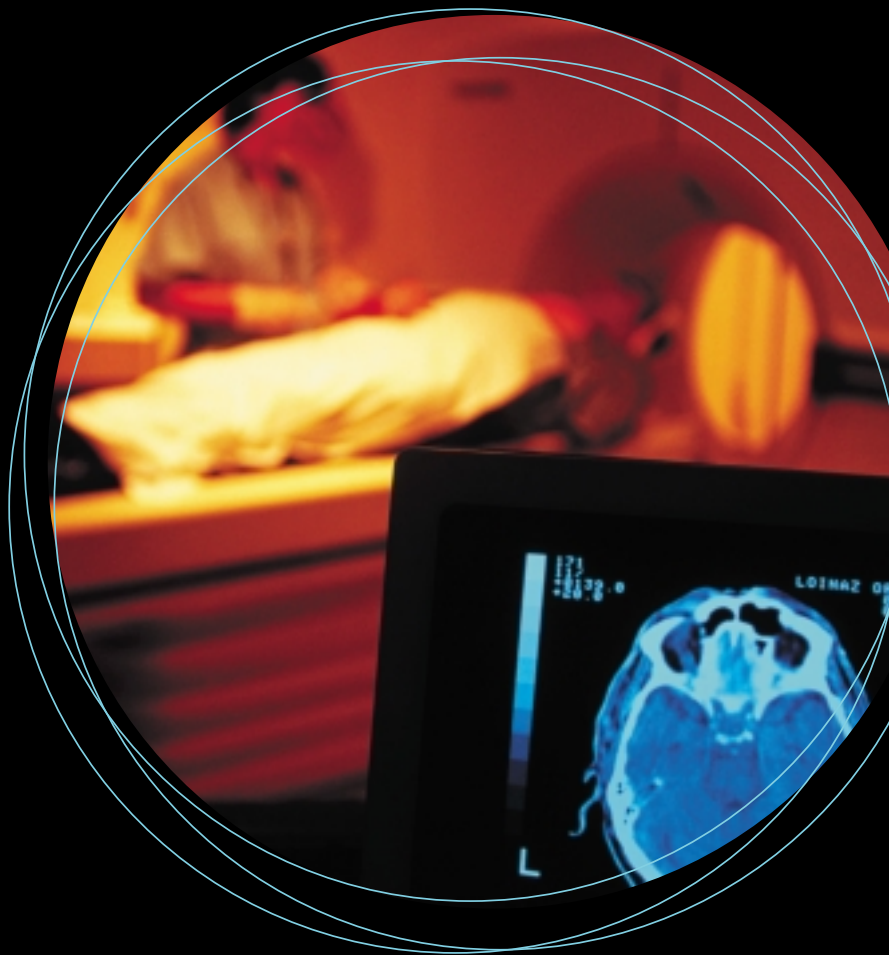


The Bio-Health Industry in Denmark

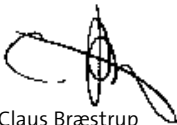
*A strategy and 10 recommendations
from the Vision Round Table for
Biotechnology, Health Care and
Industrial Development*



Preface

The bio-health industry is one of the world's leading industries in terms of growth, innovation and creation of high salary jobs. Many major countries and regions are striving to attract this source of taxable wealth.

Denmark – especially Medicon Valley in co-operation with other Danish regions – has the potential to become a leading European region in bio-health if the right decisions are taken. Therefore, the Danish government has established a Vision Round Table to provide input to a strategy for the Danish bio-health area. This report presents the results of a series of in-depth discussions in the Vision Round Table from October 2001 to June 2002. These discussions are condensed into a vision for the Danish bio-health industry and 10 specific recommendations addressing the key barriers for realising this vision.



Claus Bræstrup
Executive Vice President, Lund-beck



Eva Steiness
CEO, Zealand Pharma



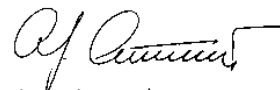
Paul J. Coleman
CEO, Biogen Denmark



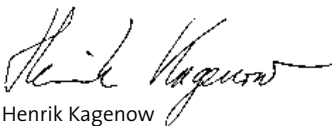
Mikael Ørum
Chairman, Ventac



Børge Diderichsen
Vice President, Novo Nordisk



Asger Aamund
Chairman, NeuroSearch



Henrik Kagenow
CEO, Bang & Olufsen Medicom

The Challenge

Throughout the world the bio-health industry is one of the fastest growing and most wealth creating industries today. The potential of this industry is substantial in job creation, innovation and growth. However, on a global scale competition is fierce. The growing bio-health industry is geographically clustered in certain countries and regions and many strive to attract this rich source of taxable wealth.

The challenge for Europe – and Denmark – is huge. Today America is well ahead of Europe and the gap increases. US public expenditure in bio-health research is rapidly growing. Even though 2000 was the best year yet for European biotechnology, the USA increased its lead. While Europe has now more biotechnology companies than the USA, Europe produces fewer products, employs fewer people and has less finance to develop the industry. Moreover, still more European bio-health companies place investments in the US where business conditions are judged to be more favourable.

Europe has to develop a thriving bio-health industry if the goals of economic competitiveness set at the Lisbon meeting in 2000 are to be fulfilled. Recognising this the Commission of the European Union has prepared an overall life sciences and biotechnology strategy for Europe, which was agreed upon by the EU ministers at the Barcelona Summit in March 2002.

The life sciences and biotechnology strategy will only be realised if the member states and regions take the right decisions.

Denmark – particularly Medicon Valley – has a strong potential to become one of the leading bio-health regions in Europe in the fields of medicines, biotechnology and medical devices, including IT and electronics. Other Danish regions will benefit from growth in Medicon Valley. Thus, Denmark as a whole can benefit from an increasing European focus on biotechnology at the same time as Denmark can contribute substantially to fulfilling the European objectives.

The Vision

The vision for a Danish bio-health strategy should be that Denmark – particularly Medicon Valley in co-operation with the other Danish regions – in 2010 should be among the most competitive bio-health regions in Europe both in terms of scientific achievement and industrial growth.

Realising this vision would mean that industry will prosper, scientific environments will flourish and society will have a stronger base of taxable wealth to finance a high level of welfare for the public.

The realisation of this vision requires a committed focus on four key issues:

- Substantial investments targeted on excellent research, innovation and infrastructure
- Access to a highly qualified work force
- Access to equity capital in all phases of company development
- Public legislation and taxation conducive to entrepreneurship, partnerships and product development

This vision will only be realised if it is supported by political action and strengthened co-operation between industry, universities and hospitals.

Benchmarks

The following set of benchmarks is proposed in order to establish a monitor to measure the progress towards the vision in 2010 so corrective action can be taken if targets are not met.

- **Wealth creation**

The value added per employee in the Danish bio-health industry must at least be at the same level as the value added per employee in the bio-health industry in competing regions/countries.

- **Job creation**

The rate of job creation in the Danish bio-health industry should surpass the rate of job creation in the bio-health industry in competing bio-health regions/countries.

- **Labour supply**

Highly skilled labour at all levels relevant to the Danish bio-health industry should be available at least by the same volume as to the bio-health industry in competing countries/regions.

- **Exports**

The growth rate in Danish bio-health industry exports must exceed the growth rate in bio-health industry exports of competing regions/countries.

- **Entrepreneurship**

The new company growth rate in the Danish bio-health industry must outreach the new company growth rate in the bio-health industry in competing regions/countries.

- **Attracting highly skilled people from abroad**

The number of foreigners possessing highly skilled jobs in the Danish bio-health industry should be tripled from 2002 to 2010.

- **Public research**

Public research investments in the Danish bio-health area must at least match investments made in the bio-health area in competing countries/regions.

10 Key Recommendations

1. Building on existing cluster strengths

- All bio-health regions are dependent on geographically close interaction among industry, universities and hospitals. The Danish bio-health strategy must acknowledge and build on regional competencies already obtained. In Medicon Valley, the successful results of the past decade calls for an expansion of the bio-region in terms of labour supply, research co-operation, technology transfer, capital market and infrastructure. To ensure future growth the Vision Round Table recommends increasing investments in R&D and infrastructure in Medicon Valley. Regulatory barriers for work force mobility in the region should be removed. In other Danish regions, local competencies in universities and companies should be further developed in various and potentially prosperous niches of the expanding bio-health industry by combining, e.g., electronics, medical devices and information technology with health care.
- Due to Denmark's size it is necessary to strengthen international co-operation between regions, especially concerning labour supply and research. It is vital to have brain circulation with other countries to ensure a critical mass of highly skilled personnel. Special attention should be given to the potential for collaborations within the Scandinavian-Baltic region.

2. Competitive public funding of world class research

- Research investments are long-term investments that should not be neglected in the light of short-term fiscal problems. Investments must be targeted on the excellent researchers and research groups – and not evenly spread.
- In comparison to the competing countries/regions Denmark has previously been a late arriver when it comes to research investments. It is therefore important that public research investments are deployed earlier in new scientific fields that rest on existing pillars of strength.

Multidisciplinary research combining biotechnology with other technologies such as, e.g., nano-, information- and materials technologies should be a high priority investment area.

- Danish universities compete not only with each other but also with the best European and other foreign universities. Research investments should therefore be based on assessments of the capacity of the universities to excel in science and education. Universities should compete for resources in order to ensure excellence in research teams.
- The future Danish research priorities for the bio-health area should be more aligned with the EU 6th Framework Programme in order to attract maximum funding.

3. More industrial co-financing of public research

- Industry should increase co-financing of research projects, Graduate Schools of Research etc. at public institutions of industrial interest.
- The public sector should support industrial co-financing by developing models for co-financing of a simple and transparent character while safeguarding the independence of research.

4. Modernising university management

- University management must be strengthened. University managers holding key university positions should have the necessary management tools, i.e. ability to prioritise resource allocation, including the tools to promote successful projects. University management structure should be changed, so the governing board of the university has a majority of external members.
- New research investments should favour universities with a dynamic and efficient university management system. The funding system for research should be simplified once the university management is modernised at all universities. The existing two-tier system for allocation of research funds (i.e. through universities and through Research Councils) should be maintained.

5. Strengthening the partnerships between industry and research institutions

- The partnerships between universities, hospitals and the bio-health industry on research, joint training and competence development must be further strengthened. The Industrial Ph.D. Fellowship Programme should be promoted as a simple and efficient mechanism of technology transfer. Other simple mechanisms for co-financing Ph.D.s should also be explored, for instance co-financing through Graduate Schools of Research.
- In order to strengthen the commercialisation of patents investments in Technology Transfer Offices should be made at all universities. Such offices constitute potential new sources of revenue for the universities and thus represent a strategic tool for university managements. Technology Transfer Offices should be professionalised as they are in USA. Technology Transfer Offices should therefore be established in co-operation with organisations that have competencies in this field, e.g. foreign firms.
- A model for sharing the benefits of inventions, devised so as to give incentives to all stakeholders, should be introduced at all universities. Such a model should ensure that both the inventor and the department receive a substantial part of the profit.

6. Expanding the supply of skilled labour

- It is vital for the continued progress of the bio-health Industry to have an adequate supply of a skilled work force at all qualification levels. At the present the bio-health industry feels a shortage of skill supply in various fields, e.g. Ph.D.s. Crucial skills at graduate and Ph.D. level are chemistry, biochemistry, bioinformatics, physics, engineering, data management pharmaceutical sciences and clinical development.

- Insufficient supplies of labour should be solved in a closer partnership involving industry, government and relevant schools/universities. This way, problems can be addressed at an early stage, and industry can help to tap resources from parts of the labour market that remains untapped so far, i.e. the unemployed and non-Danish citizens.
- There seems to be no need for new educations, but it is important that students can combine various scientific disciplines at the post bachelor level. It is vital to secure the students' fundamental skills in the fields of biology, medicine, organic chemistry, physics, mathematics and IT. One way of doing this is to ensure critical mass in the teaching of these disciplines at bachelor and master level for example through close co-operation between universities/faculties.
- Initiatives should be taken to stimulate interest in the natural sciences among the children of school age and the younger generations in general.
- Valuable knowledge is currently not receiving adequate protection. It is of considerable importance to improve the competencies in IPR (Intellectual Property Rights) by upgrading the IPR education at all levels. In a longer perspective Danish competencies also need to be established with regard to elaboration of patent strategies, licensing and business development.
- The future need for a skilled work force in the bio-health industry should be regularly discussed between industry and the relevant ministries, as is the case within other important industries.

7. Continuous access to equity capital

- It is important that the capital market can supply swift and competent capital for all phases of the development of new products and firms. The Danish venture capital market has improved considerably during the last decade. However, there is still a need for public pre-seed capital, which the private market cannot supply alone.

- The Growth Fund should refrain from competing with private venture funds and act more like a business angel. It should expedite the deployment of capital, offer loans with less strings attached and accept higher risks. A company receiving loans from the Growth Fund should be given the option to repay the loan when it manages to attract further finance or to convert the loan into shares which are given to the Growth Fund.

8. Tax system

- To act as an incentive for highly skilled personnel to make an extra effort and to attract foreign expertise the government should lower income tax rates, especially the marginal taxation on the highest incomes.
- In order to reward personal risks and to attract investors – especially foreign investors – it is vital to improve conditions for founder shares and stock options. Founder's shares and stock options given to employees should be taxed when sold. Furthermore, the share premium should be taxed according to the tax rules applying to share premium and not those applying to income tax as is the case today. Options should be limited to a fixed proportion of the total salary to prevent excessive payment in options.
- The Government's initiative to align foreign key professionals and researchers in terms of taxation is an important step in attracting and retaining highly skilled professionals from abroad.
- The initiative to introduce a tax deduction rate of 150 per cent for companies that invest in joint public-private research projects should be designed to avoid excessive red tape. First, the rules for tax reduction should be transparent. Second, the initiative should be expanded to include co-financing of Graduate Schools of Research, continuation of existing research collaboration and mutual mobility between companies and universities.

9. Flexible public regulation in product development

- A flexible and fast working public regulatory system for the development of medicines and devices is a fundamental framework condition for all bio-health clusters. It is therefore important that Denmark maintains and develops a public regulatory system covering all aspects of the development and approval processes (ethical committees, reimbursement and marketing approvals etc.), which is among the most efficient in Europe.
- With regard to the approval of medicines and products transparency of procedures, good review ability and willingness to give informal opinion are decisive factors for industry. The Danish Medicines Agency should secure solid basic expertise in the fields of toxicology and clinical trials and the field chemistry, manufacturing and control (CMC). Furthermore, the Danish Medicines Agency should develop world class expertise in other selected areas in partnership with research institutions and private companies in order to operate on an increasing competitive European market for approval of medicines and products.
- The three university hospitals' Good Clinical Practice procedures should be harmonised in order to secure the best conditions for mobility of researchers and students.

10. Well-informed public perception

- A well-informed public opinion is an important condition for the further development of the bio-health industry. The responsibility for the dissemination of information rests with the public sector as well as the private sector. The ongoing government initiative to promote openness and debate on bioethics is important and should be continued. Furthermore, the government should inform, stimulate and qualify the debate in new areas of ethical interest. Companies should contribute by enhancing transparency and by informing the public on ethical issues. Finally, the ethical discussion should not be confined to biotechnology. It is the application of biotechnology – and other technologies – and not merely the technology in itself that may give rise to ethical questions.

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**National Agency for
Enterprise and Housing**

Dahlerups Pakhus
Langelinie Allé 17
DK-2100 København Ø

Tel. (+45) 35 46 60 00
www.ebst.dk

Erhvervslivets Hotline
Tel. (+45) 35 46 66 66