

DANISH LIFE SCIENCE PLAYS AN IMPORTANT ROLE FOR THE DANISH SOCIETY

The Danish Life Science Industry plays an increasingly important socio-economical role for Danish society. There are more than 1500 life science companies in Denmark with more than 47.500 employees (= 2.2 % of the workforce), and export growth from DKK 40 bn in 2007 to DKK 151 bn (= 22% of the total export) in 2020.

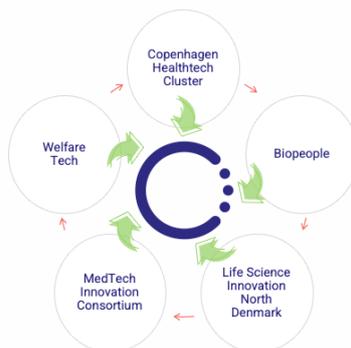
The Danish life science industry invests yearly DKK 15 bn in their own research, and foreign life science companies invest annually DKK 34 bn in research and development in Denmark. Apart from Switzerland, this makes Denmark the country worldwide that invests most in private pharma research and development. And it makes the pharma industry the sector in Denmark investing the most in research.

At the same time, the Danish health care system is facing a democratic challenge with an aging population, an increase in the number of citizens with multiple chronic diseases and rapidly increasing health care costs while at the same time qualified health care personnel is becoming a limited resource. Altogether challenges where the solutions can be found by developing partnerships between academia, hospitals, and industry with a focus on prevention, developing better diagnostics and medicines, better use of health data, and digitalization and automatization of processes.

Introduction to Danish Life Science Cluster – a knowledge broker in the Danish life science ecosystem

Research is the necessary basis for the development of new drugs and health care and strong collaborations between Danish research institutions, hospitals, and companies are seen as an important prerequisite for the success of the Danish Life Science Industry.

Danish Life Science Cluster supports knowledge sharing and facilitates collaboration between research and industry to translate Danish research into new and better commercial solutions for the benefit of companies, healthcare, municipalities, and citizens throughout the country [1].



Danish Life Science Cluster was established in 2021 by the merger of five regional life science clusters. The purpose of the merger was to create a strong national organization covering both life science, welfare technologies, and health data while at the same time having a strong regional anchoring from regional hubs placed in proximity to the largest research institutions and hospitals in all areas of Denmark. Today we have hubs located in Copenhagen, Aarhus, Odense, and Aalborg and a fifth hub is planned to be established close to the hospital in Nykøbing Falster in Region Zealand.

The strong regional presence is combined with national activities and collaborations between the individual hubs and their stakeholders, and furthermore with an international outreach from participation in various projects outside Denmark.

A broad partnership supports Danish Life Science Cluster

Organizations from both industry, academia, regions, municipalities, and business organizations were founding partners of Danish Life Science Cluster (see appendix) and are represented on the board.

Danish Life Science Cluster is financed by grants from the ministry of research and higher education and the ministry of industry, business, and financial affairs, as well as funding from externally financed projects, and membership fees from 219 paying members (143 companies, 17 research institutions, 36 municipalities, five regions, and 18 sector- and business organizations).

1. <https://www.danishlifesciencecluster.dk/danmarks-nationale-sundhedsklynge/>

A short presentation of three of the major stakeholder groups supporting Danish Life Science Cluster

The Danish healthcare system is represented by the five regions and Local Government Denmark (also known as Kommunernes Landsforening) is one of the founding partners of Danish Life Science Cluster.

The Danish healthcare system is based on the principles of free and equal access to healthcare for all citizens. The healthcare system offers high-quality services, the majority of which are financed by general taxes [2].

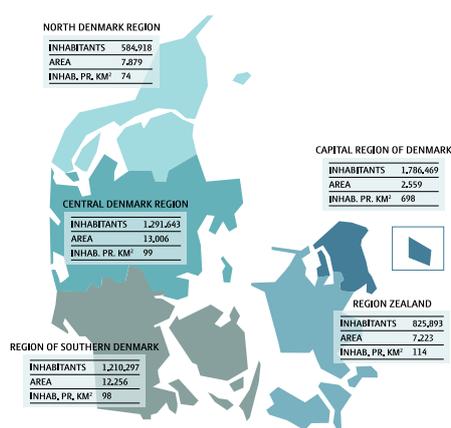


Figure 1 - source: <https://www.regioner.dk/ambulance-in-dk/about>

The Ministry of Health is responsible for establishing the overall framework for the provision of health. This includes legislation on the organization and provision of health services, patients' rights, healthcare professionals, hospitals and pharmacies, medicinal products, vaccinations, maternity care, and child healthcare. The legislation covers the tasks of the regions, municipalities, and other authorities within the area of health [3].

Denmark is divided into **five regions** that differ in relation to their physical geography, areas, and populations. For example, more than 30 percent of the inhabitants of Denmark live in the Capital Region of Denmark, which at the same time is the smallest region in terms of its area [4].

The regions have the responsibility for all treatment provided by the Danish Healthcare System. The regions operate public hospitals. The regions are also responsible for the medical practice sector's functioning. For example, the regions are the guarantors for all Danes having access to a practicing physician. The regions also enter into agreements with a number of privately practicing specialist physicians and other occupational groups, for example, dentists, psychologists, and physiotherapists, whose services are used by Danish citizens [5].

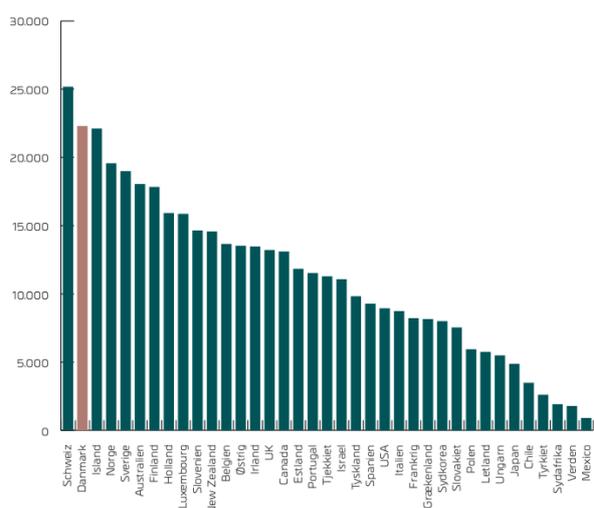
Apart from the 5 regions, Denmark is furthermore divided into 98 municipalities that are responsible for several health and social services. Local health and elderly care services include disease prevention and health promotion, rehabilitation outside hospital, home nursing, school health services, child dental treatment, child nursing, physiotherapy, alcohol, and drug abuse treatment, home care services, nursing homes, and other services for elderly people. In addition, municipalities co-finance regional rehabilitation services and training facilities.

Another large stakeholder group supporting Danish Life Science Cluster is the academic institutions in Denmark. The five largest universities and five of the Research and Technology Organizations were founding partners, and after the founding of the organization further universities and research institutions have become members of the cluster.

There are a total of 33.565 FTEs and 150.500 students enrolled at the Danish universities, and they have a combined annual budget of DKK 30 bn.

Danish universities have a strong research tradition which can be measured directly in the number of research publications, and Danish academia is currently on a second place worldwide when measured on a number of publications per capita (data from the period 2015-2019).

A unique type of research organization in Denmark is the government-approved Research and Technology Organisation (called GTS institutes) that plays a key role in the Danish innovation system as a link between technology and business. They are publicly owned but are run as independent companies with the primary goal to make new technological methods applicable to businesses and promote businesses' uptake of new technology. They play an important role in the Danish innovation support system as providers of new technologies for the Danish companies.



Kilde: OECD og Uddannelses- og Forskningsministeriet via Scival

Presentation of the danish life science industry

The industry plays an important part in the life science ecosystem. There is a strong tradition for collaboration between industry, universities, and the public health sector, which makes Denmark a hotspot for pioneering R&D [6]. Collaboration between companies and clinicians, for instance, strengthens research and treatment. Apart from Switzerland, Denmark is the country worldwide with the heaviest investment in private pharma research and development [7].

The progressive innovation of major international pharmaceutical companies such as Novo Nordisk, Lundbeck, LEO Pharma, and ALK has created one of the world's strongest biotech and pharma clusters [8].

The Danish life science industry makes a large and important contribution to the national economy, including exports of life science products of DKK 152 bn in 2020 [9].

In total, more than 47.500 people are employed in approximately 1500 life science companies in Denmark [10] (2016 figures). Of these, approx. 850 companies produce medical devices, the largest being Oticon and Coloplast. Approx. 550 companies are primarily pharmaceutical and biotech companies, respectively. The remaining approx. 100 companies produce both medical devices and pharmaceutical products/biotech, the largest being Novo Nordisk A/S. The majority (approx. 80%) of the 1500 life science companies are micro-companies (0-9 full-time employees).



Our ambition is to build a world class life science cluster

Danish Life Science Cluster has the ambition to build a national cluster that can compete with the best life science clusters in the world, measured by the number of knowledge-based collaborations among stakeholders in the ecosystem as well as by ensuring growth in companies and the ability to commercialize research and knowledge.

We will do this by strengthening the collaboration and supporting partnerships between the stakeholders in the national life science ecosystem by the following activities:

- Increase contact between researchers from academia, hospitals, and industry through **networking activities** (e.g., site visits at both industry and research institutions).
- Support **knowledge sharing** (e.g. by organizing and hosting symposias and conferences).
- Increase **co-creation, innovation, and learning** (e.g., by facilitation at dialogue meetings, hackathons, and workshops).
- Facilitating collaboration and **Public-Private-Partnerships** as a method to increase innovation (e.g., in strategic projects participants from both public and private organizations).
- Support **promotion and visibility** of members and stakeholders through our communication channels by sharing success stories and news.
- Attract **international talent and funding** by sharing research results and success stories from the Danish ecosystem at international events and through collaboration in international projects.

Examples on core activities in the cluster

Network activities – increasing contact and knowledge sharing between academia and industry

- **The NGS tech network** – a network for researchers working with Next Generation Sequencing (NGS) and looking for inspiration. The NGS Tech network aims to grow a community of national NGS enthusiasts who wish to gain new knowledge and discuss challenges to push the technology to the next level. The network is founded by researchers from both academia and companies. ([For more info](#))

International projects provide both knowledge, visibility, and access to new markets to participating companies

- The **Accelerate Health Innovation Across Boundaries** project is a German-Danish project with a focus on common healthcare challenges in the Danish and German market ([For more info](#))
- Digitalization is high on the political agenda in the EU. The technological development in artificial intelligence (AI) and data processing creates new opportunities for better and more resource-efficient solutions and services. Not least in the elderly care sector, where an increasing number of older people and a decreasing labor force put massive pressure on the sector. **The Care-AI network** project promotes this development by establishing a sustainable, interdisciplinary network across the German-Danish border. The network invites relevant research institutions, elderly care organizations, companies, and other relevant stakeholders to participate, share and co-create knowledge, ideas, and experiences about digital and AI solutions focusing on elderly care. The cross-border network collaboration will identify current, urgent, and potential future needs and challenges related to the digitalization of elderly care to increase its quality. Moreover, the Care-AI network project provides the opportunity to strengthen partnerships and develop new projects ideas for demand-driven AI solutions ([For more info](#))

In Denmark, public-private innovation is a highly used method for generating new solutions for societal needs

- The **Clinical Decision Support System** project is a research collaboration that develops a clinical decision support system based on artificial intelligence to help health personnel in municipalities and hospitals identify citizens who are at risk of acute hospitalization ([For more info](#))
- **Genstart** is a project analyzing the bottle necks preventing the use of health data and potential solutions for these. The project is funded by the ministry of research and higher education and the ministry of industry, business, and financial affairs ([For more info](#)).

Contact info to the regional hubs in Danish Life Science Cluster

HUB Hovedstaden
COBIS
Ole Maaløes Vej 3
2200 København N
+45 5115 9451
hovedstaden@danishlifesciencecluster.dk

HUB Midtjylland
Incuba
Palle Juul-Jensens Boulevard 82
8200 Aarhus N
+45 5115 4530
midt@danishlifesciencecluster.dk

HUB Nordjylland
C. A. Olesens Gade 4, 2. sal
9000 Aalborg
nord@danishlifesciencecluster.dk

HUB Syddanmark
Forskerparken
Forskerparken 10H
5230 Odense M
+45 5118 0664
syd@danishlifesciencecluster.dk

HUB Sjælland
Athenahuset, c/o FIERS
Strandboulevarden 64
4800 Nykøbing Falster
+45 5179 1790
sjælland@danishlifesciencecluster.dk

CELIS is funded by the European Union's COSME Programme (GA No.: 873857)

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Appendix - Founding partners

Universities

Aalborg Universitet

Aarhus Universitet

Danmarks Tekniske Universitet

Københavns Universitet

Syddansk Universitet



Research and Technology Organizations

Alexandra Instituttet

Bioneer

DHI

Force

Teknologisk Institut

Regions and municipalities

Region Nordjylland

Region Midtjylland

Region Syddanmark

Region Hovedstaden

Region Sjælland

Kommunernes Landsforening

Industry organizations

Lægemiddelindustriforeningen

MedicoIndustrien

Dansk Biotek

Danish Care

Dansk Industri

Dansk Erhverv