PRECISEU

WORK PACKAGE 3

D3.4 Case Study Denmark

IA Lithuania

30/09/2025

Co-funded by the European Union

This project has received funding from the European Union's Horizon Europe research and innovation programme under Grant Agreement No 101161301

DISCLAIMER

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Innovation Council and SMEs Executive Agency (EISMEA). Neither the European Union nor the granting authority can be held responsible for them

Project information	
Project title	PeRsonalised medicine Empowerment Connecting Innovation ecoSystems across EUrope
Acronym	PRECISEU
Project URL	https://cordis.europa.eu/project/id/101161301
Grant Agreement n.	101161301
Call	HORIZON-EIE-2023-CONNECT-03
Call Topic	HORIZON-EIE-2023-CONNECT-03-01- Implementing co-funded action plans for connected regional innovation valleys
Type of Action	HORIZON-COFUND- HORIZON Programme Cofund Actions
Project start/end date	01/07/2024-30/06/2029
Project duration	60 months
EU Project officer	Christina Nanou (EISMEA)
Project coordinator	Montse Daban (Biocat)
Project manager	Núria Radó and María Cejas (Biocat)

Deliverable information	
Deliverable n.	D3.4
Work package n.	WP3. Interregional Collaboration and Partnership Bridging
Deliverable title	Case Study Denmark
Lead beneficiary	IA Lithuania
Participants	IA Lithuania
Main authors	Rasa Kavaliauskaitė, Paulius Kamaitis
Contributors	Biocat
Reviewed by	Jette Østergaard Rathe, Malene Kristine Nielsen, AMGROS
E-mail Contact for queries	r.kavaliauskaite@innovationagency.lt
Due date	30/09/2025
Document status	Final
Document version number	3
Document type*	R – Report
Dissemination level	PU – Public

*Legend = **R –** Report // **DEM –** Demonstrator, pilot, prototype, plan designs // **DEC –** Websites, patents filing, press & media actions, videos, etc. // **DMP –** Data management plan // **OTHER –** Software, technical diagram, algorithms, models, etc.

CONSORTIUM PARTNERS

	Name of the Entity	Acronym	Role	Country
1	BIOCAT LA FUNDACIO BIOREGIO DE CATALUNYA	BIOCAT	COO	ES
2	DEPARTAMENT DE SALUT- GENERALITAT DE CATALUNYA	SALUT	BEN	ES
3	BARCELONA SUPERCOMPUTING CENTER CENTRO NACIONAL DE SUPERCOMPUTACION	BSC-CNS	BEN	ES
4	BIORN CLUSTER MANAGEMENT GMBH	BIORN	BEN	DE
5	BIOPRO BADEN-WUERTTEMBERG GMBH	BIOPRO	BEN	DE
6	AGENTIA PENTRU DEZVOLTARE REGIONALA NORD-EST	NE RDA	BEN	RO
7	ASOCIATIA DIGITAL INNOVATION ZONE ZONA DE INOVARE DIGITALA	DIZNE	BEN	RO
8	CLUSTERUL REGIONAL INOVATIV DE IMAGISTICA MOLECULARA SI STRUCTURALA NORD-EST (IMAGO-MOL)	IMAGO-MOL	BEN	RO
9	BIOTEHNOLOGICHEN I ZDRAVEN KLASTER	HLSCB	BEN	BG
10	STOLICHNA OBSHTINSKA AGENTSIA ZA PRIVATIZATSIA I INVESTITSII	SIA	BEN	BG
11	CLUST ER INDUSTRIE DELLA SALUTE E DEL BENESSERE	CLUST ER	BEN	IT
12	REGIONE EMILIA ROMAGNA	RER	BEN	IT
13	ART-ER-SOCIETA CONSORTILE PER AZIONI	ART-ER	BEN	IT
14	VLAAMSE GEWEST	EWI	BEN	BE
15	BIOVIA	BIOVIA	BEN	BE
16	VIESOJI ISTAIGA INOVACIJU AGENTURA	IA LITHUANIA	BEN	LT
17	BRG, BUSINESS REGION GOTEBORG AB	BRG	BEN	SE
18	EATRIS ERIC	EATRIS	BEN	NL
19	PLATAFORMA DE ORGANIZACIONES DE PACIENTES	POP	BEN	ES
20	AGENCIA PER A LA COMPETITIVITAT DE LA EMPRESA	ACCIO	BEN	ES
21	IDRYMA TECHNOLOGIAS KAI EREVNAS	FORTH-ICS	BEN	EL
22	REGION OF CRETE	CRETE	BEN	EL
23	SAHLGRENSKA SCIENCE PARK AB	SSP	BEN	SE
24	RIVNE INTERREGIONAL MEDICAL CLUSTER	RIVNE	BEN	UA
25	ASTRAZENECA FARMACEUTICA SPAIN S.A.	ASTRAZENECA	BEN	ES

Tab. 1 The PRECISEU'S Consortium

Co-funded by the European Union

WORK PACKAGES AND LEADERS

Work Packages Name		WP Leader
WP 1	Project Management and Coordination	Biocat
WP 2	Communication and Dissemination	NE RDA
WP 3	Interregional Collaboration and Partnership Bridging	IA Lithuania
WP 4	Use of Health Data	ART-ER
WP 5	Multistakeholder infrastructure to enable access to ATMP on large scale	BIO PRO
WP 6	Market and Patient Access	SSP
WP 7	Training and Cultural Change	HLSCB
WP 8	Adoption of PM innovations in the HealthCare System	SALUT
WP 9	Innovation Support Program	Biocat

Tab. 2 The PRECISEU'S Work Packages

How to cite this document
Kavaliauskaitė, Rasa (2025). PRECISEU D3.4 Case Study Denmark, Innovation Agency Lithuania.

TABLE OF CONTENTS

CONSORTIUM PARTNERS *4*
TABLE OF CONTENTS *6*
1. Danish Ecosystem Overview *11*
NATIONAL HEALTH SYSTEM 11
HEALTH DATA LANDSCAPE 12
LIFE SCIENCES 12
CLUSTERS AND NETWORKS 13
PROFESSIONAL ASSOCIATIONS AND REGULATION BODIES 13
ACADEMIA 14
RESEARCH CENTERS 15
2. Existing Legal Framework *15*
PRIMARY USE OF HEALTH DATA 15
3. Innovation Agenda in the Field *18*
OVERVIEW OF NATIONAL AND REGIONAL INNOVATION AGENDAS 18
4. SWOT Analysis *21*
5. Transferable Good Practices *22*
THE DIGITAL HEALTH CENTRE 22
NATIONAL WHOLE GENOME SEQUENCING CENTER 22
6. Good Practices Related to Gender Diversity and Inclusiveness *24*
WOMEN IN STEM INITIATIVES 24
WOMEN ENTREPRENEURS IN HEALTHCARE 24
GENDER EQUALITY IN EDUCATION 25
EXISTING MULTI-REGIONAL PROJECTS AND INITIATIVES 25
MAIN AREAS FOR FUTURE DEVELOPMENT AND COLLABORATION 27
7. Conclusions *28*
POSITIVE DEVELOPMENTS 28
GAPS AND CHALLENGES 28
IMPROVEMENT OPPORTUNITIES 29

Co-funded by the European Union

LIST OF ACRONYMS AND ABBREVIATION

Abbreviation	Description
AI	Artificial Intelligence
ATMP	Advanced Therapy Medicinal Product
BII	The BioInnovation Institute
COPD	Chronic Obstructive Pulmonary Disease
CPR number	Civil Personal Registration number
DANWISE	The Danish Society for Women in Science
DCCC	nish Comprehensive Cancer Center
DKK	Danish krone
DNGC	The Danish National Genome Center
DTU	Technical University of Denmark
EC	European Commission
EEA	European Economic Area
EHDS	European Health Data Space
EHRs	Electronic Health Records
EISMEA	European Innovation Council and SMEs Executive Agency
EU	European Union
GDPR	General Data Protection Regulation
IPR	Intellectual Property Rights
IT	Information Technology
MOMA	Molecular Medicine
MS	Member States
MVA	Medicon Valley Alliance
NCD	Non-Communicable Diseases
NCDs	Non-Communicable Diseases
National HPC Center	The National High Performance Computing Center
OECD	The Organisation for Economic Co-operation and Development
PERSIMUNE	Centre for Personalised Medicine of Infectious Complications in Immune Deficiency
PM	Personalised Medicine
PPP	Purchasing Power Parity
PRECISEU	Project “PeRsonalised medicine Empowerment Connecting Innovation ecoSystems across Europe”

R&D	Research & Development
RBGB	Regionernes Bio- og GenomBank
RIV	Regional Innovation Valley
RKKP	The Danish Clinical Quality Registries
SDU	University of Southern Denmark
SMEs	Small and Medium-Sized Enterprises
SSI	Statens Serum Institut
STEM	Science, Technology, Engineering, and Mathematics
UCPH	University of Copenhagen
UK	United Kingdom
WHO	World Health Organization
WGS	Whole Genome Sequencing
WiLD	Women in Life Science Denmark
WP	Work Packages

EXECUTIVE SUMMARY

Europe ambitions to have the best talent working with the best companies, with deep-tech innovation creating breakthrough solutions across the continent and inspiring the world. The Regional Innovation Valleys (RIVs) aim to strengthen and better connect regional innovation players throughout Europe, including regions with lower innovation performance.

RIV initiatives will support Member States (MS) and regions in bridging the gaps and activating innovations in deep-tech for key priorities of the European Union (EU); directing funding to concrete interregional innovation projects — complementing large networks and consortia at the MS Level and placing Europe at the forefront of wellbeing and sustainable transition.

Europe's competitiveness relies largely on technology-based innovations in the health sector. Healthcare innovations represent a pillar of all EU policies and a cross-cutting priority, with fundamental importance to public authorities and local communities in terms of investment opportunities and the quality of life of the 448 million citizens of the European continent. And the most transformative commitment that the European Commission (EC), along with National and Regional Authorities, is acquiring toward healthcare is to channel huge efforts and funding towards Personalised Medicine (PM), which is on the backbone of several initiatives for building the European Health Union, and the ground test for the technology-driven transformation of the health care domain.

According to the European Council's conclusion on Personalised Medicine for patients, Personalised Medicine refers to "a medical model using the characterisation of individuals' phenotypes and genotypes for tailoring the right therapeutic strategy for the right person at the right time, and/or to determine the predisposition to disease and/or to deliver timely and targeted prevention."[1]

PRECISEU envisions accelerating the integration of the PM paradigm across Europe, sustainably connecting regional innovation ecosystems, reducing the gap between regions, and facilitating patients' access to deep-tech innovations. In five years, we will have successfully improved the framework for the secondary use of health data and the development of ATMPs, supporting the access of PM technologies to the market and becoming a trusted player in the EC's strategy to empower PM at the regional level.

[1] Council of the European Union, Official Journal of the European Union, Council conclusions on personalised medicine for patients (2015/C 421/03). Available at: https://op.europa.eu/en/publicationdetail/-/publication/f416ce37-a48c-11e5-b528-01aa75ed71a1/language-en

INTRODUCTION TO THIS REPORT

The partners of PRECISEU identified the relevance of highlighting the challenges of an effective implementation of Personalised Medicine model across EU by aligning their actions to the events taking place during the Presidencies of the EU. At the moment of publication of this case study, Denmark holds the presidency of the Council of the EU from 1 July 2025 and 31 December 2025. Guided by the slogan "A strong Europe in a changing world," the Danish Presidency will focus on promoting security, competitiveness, and environmental sustainability across Europe.

The Danish Presidency will emphasise healthcare as one of key pillars of a resilient and competitive Europe. Within the Employment, Social Policy, Health and Consumer Affairs Council, efforts will focus on advancing life sciences, enhancing preparedness, and fostering healthcare systems that are both inclusive and future ready.

In an era of global uncertainty and evolving health threats, the Presidency will work to strengthen the EU's supply security and capacity for medical innovation, ensuring equitable access to medicines across Member States. Special attention will be given to boosting resilience against both natural and manmade crises, with a focus on promoting personalised, patient-centred care.

Central to these efforts will be the advancement of the pharmaceutical package and the regulation of critical medicines—aiming to balance innovation with accessibility. The Danish Presidency will also support policies that promote social cohesion and equitable access to healthcare, ensuring that no one is left behind in the shift toward more tailored and effective medical solutions.[2]

The PRECISEU consortium understands that their project contributes largely to Health priority. The partners also highlight the underrepresentation of Health innovation, Personalised Medicine, Health Data and Advanced Therapies in the Danish presidency Program. For this reason, and complying with the commitments of PRECISEU's Grant Agreement, the partners deliver this case study reviewing the capacities, assets, gaps and opportunities of Denmark in this field, and have already engaged with Danish partners in the celebration of activities during this presidency.

[2] Programme of the Danish EU Presidency, 2025. European Commission. Available at: https://danish-presidency.consilium.europa.eu/en/programme-for-the-danish-eu-presidency/programme-of-the-danish-eu-presidency/

1. Danish Ecosystem Overview

NATIONAL HEALTH SYSTEM

The national health system in Denmark is a universal, tax-funded model that ensures comprehensive healthcare access for its approximately 5.9 million residents. Organised into three administrative levels—the state, five regions, and 98 municipalities—the system delivers services that are largely free at the point of use. The state oversees regulation and fiscal functions, the regions manage hospitals and primary care, and municipalities handle rehabilitation, long-term care, and public health initiatives.[3]

Healthcare financing primarily comes from a progressive personal income tax payable on wages, with public expenditures accounting for about 84% of total health spending. With most of the hospital beds being in public hospitals, private clinics and hospitals play a limited role, funded through out-of-pocket payments, private insurance, or regional contracts for wait-time guarantees or specific procedures like bariatric surgery. While most services are free, out-of-pocket payments—mainly for outpatient prescription medicines and dental care—constituted about 13% of current health expenditures in 2021.[4]

In Denmark, municipalities are funded through proportional income and land taxes, along with state block grants distributed based on population and various sociodemographic factors. These funds are then redistributed to balance differences in local service needs and tax capacity. Regions, responsible primarily for healthcare, receive most of their revenue (about 83%) from state block grants, with additional funding from municipal co-payments (16%) and performance-based incentives (1%). Allocation to regions also considers demographics, such as the number of elderly people living alone, to ensure equitable resource distribution.[5]

Denmark's health expenditure has grown steadily, rising from 8.1% of GDP in 2000 to 10.8% in 2021, surpassing the EU/EEA/UK average of 9.6% and the WHO European Region's 8.7%. Per capita spending more than doubled over the same period, reaching US\$ 7,140 in 2021—higher than in Finland and Sweden, but slightly below Germany and Norway. Public funding covers most costs (85.2%), with private spending at 14.6%, largely through out-of-pocket payments (12.4%) and a smaller share from voluntary insurance (2.2%). Around 42% of the population holds complementary insurance for services like dental care and outpatient medicines, while 32% purchase supplementary coverage for private provider access. Denmark's healthcare system is known for high patient satisfaction and low levels of unmet need, supported by a shift from hospital-based care to more integrated primary and home-based services. Digital tools like electronic health records and AI-driven diagnostics have enhanced accessibility and efficiency, though the system's decentralized structure can pose coordination challenges.[5]

[3] Denmark Health System Summary, 2024. World Health Organization, (acting as the host organization for, and the Secretariat of, the European Observatory on Health Systems and Policies). Available at: https://iris.who.int/bitstream/handle/10665/376807/9789289059626-eng.pdf?sequence=1

[4] International Health Care System Profiles Denmark, 2020. Karsten Vrangbæk, University of Copenhagen. Available at: https://www.commonwealthfund.org/international-health-policy-center/countries/denmark

[5] Health Systems and Policy Monitor (HSPM), 2024. World Health Organization, (acting as the host organization for, and the Secretariat of, the European Observatory on Health Systems and Policies). Available at: https://eurohealthobservatory.who.int/monitors/health-systems-monitor/countries-hspm/hspm/denmark-2024/financing/overview-of-the-statutory-financing-system/

Demographic factors	Denmark	EU
Population size	5 87 3420	446 735 291
Share of population over age 65 (%)	20.3	21.1
Fertility rate[1] (2021)	1.7	1.5
Socioeconomic factors		
GDP per capita (EUR PPP[2])	48 114	35 219
Relative poverty rate[3] (%)	12.4	16.5
Unemployment rate (%)	4.5	6.2

Fig. 1: Demographic and socioeconomic context in Denmark, 2022 (source: State of Health in the EU Denmark Country Health Profile 2023) 1. Number of children born per woman aged 15-49. 2. Purchasing power parity (PPP) is defined as the rate of currency conversion that equalises the purchasing power of different currencies by eliminating the differences in price levels between countries. 3. Percentage of persons living with less than 60 % of median equivalised disposable income. Source: Eurostat Database.[6]

HEALTH DATA LANDSCAPE

Denmark has built an advanced, secure, and interoperable digital health ecosystem cantered around a unique personal identifier, the CPR number, enabling robust data linkage across all healthcare settings. Since 2003, the national e-health portal Sundhed.dk supports nearly 99%- digital communication, allowing patients to access records, prescriptions, lab results, and to book appointments. Core infrastructures like the Shared Medication Record and MedCom messaging standards ensure seamless data exchange—averaging 5.5 million messages monthly among 150 systems. Denmark's National Patient Register offers 40 years of comprehensive treatment data, accessible to researchers via secure platforms, while the Health Data Authority oversees ethical, privacy-compliant usage Healthcare Denmark. Supported by strong governance, public–private partnerships, and well-established IT standards, this framework not only underpins integrated care and improved patient safety but also positions Denmark to scale innovations like personalised medicine and AI diagnostics.[7,8,9,10]

LIFE SCIENCES

Denmark boasts one of Europe's most dynamic life sciences sectors, powered by a well-educated workforce, strong-public private- partnerships, and robust R&D infrastructure. It is home to global pharma leaders like Novo Nordisk, Lundbeck, LEO Pharma, and ALK (Allergy solutions for life), and houses a dense innovation ecosystem within Medicon Valley—a cross border- cluster spanning eastern Denmark and southern Sweden

[6] State of the Health in the EU, Denmark Country Health Profile, 2023. World Health Organization, (acting as the host organization for, and the Secretariat of, the European Observatory on Health Systems and Policies). Available at: https://eurohealthobservatory.who.int/publications/m/denmark-country-health-profile-2023

[7] Digital Infrastructure, 2023. Healthcare Denmark. Available at: https://healthcaredenmark.dk/national-strongholds/digitalisation/digital-infrastructure

[8] Collection and sharing of health data, 2023. Healthcare Denmark. Available at: https://healthcaredenmark.dk/national-strongholds/digitalisation/collection-and-sharing-of-health-data

[9] AI in Action: Denmark's Role as a Global Leader in Healthcare Innovation, 2024. Ministry of Foreign Affairs of Denmark, Invest in Denmark. Available at: https://investindk.com/insights/ai-in-action-denmarks-role-as-a-global-leader-in-healthcare-innovation

[10] Nøhr, C., Parv, L., Kink, P. et al. Nationwide citizen access to their health data: analysing and comparing experiences in Denmark, Estonia and Australia. BMC Health Serv Res 17, 534 (2017). https://doi.org/10.1186/s12913-017-2482-y

of over 400 biotech firms and 17 universities. Over 49,000 people are employed in life sciences—accounting for around 22% of Danish exports and making it one of the greatest country's export areas.[11,12,13]

The life science industry has grown rapidly: the number of pharma and biotech companies rose by 224 between 2010 and 2020, and the sector saw a 25% increase in employment over 12 years. Denmark ranks among the top EU countries for biotech investment and innovation. The government has launched "Life Science Strategy 2030" in November 2024 outlining six priorities—from scaling startups and enriching health data use to strengthening international partnerships—aimed at consolidating Denmark's position as a European leader. A bioindustry study estimates that better university tech transfer could create 9,500 new jobs by 2030.[14]

Denmark's strengths—advanced clinical trial infrastructure, seamless access to national health data, and sustainability initiatives in manufacturing—make it a global hub for personalised medicine, biotech, and pharmaceutical innovation.

CLUSTERS AND NETWORKS

- Medicon Valley Alliance (MVA) is a life sciences cluster with a strong focus on biotech, personalised medicine, and precision diagnostics. It includes universities (e.g., University of Copenhagen), hospitals, companies, and regional authorities.
- Danish Life Science Cluster is a national innovation network for health tech and life sciences. It supports cross-sector collaborations between companies, universities, and public health institutions, including initiatives in personalised and precision medicine.
- The Personalised Medicine Network (Aarhus University) focuses on advancing interdisciplinary research, integrating personalised medicine into education, developing research talent, and promoting the clinical implementation of research findings.
- Biopeople (Denmark's Life Science Cluster) is a national life science and health cluster, formerly a part of Denmark's innovation network system. It brings together stakeholders in academia and industry working on precision health, pharma, and biotech innovation.

PROFESSIONAL ASSOCIATIONS AND REGULATION BODIES

- Danish Medicines Agency (Lægemiddelstyrelsen) regulates the development, approval, and monitoring of pharmaceuticals, including companion diagnostics and personalised treatments, ensuring safety and efficacy in clinical use.
- Danish Health Data Authority (Sundhedsdatastyrelsen) oversees national health registries and data infrastructure, enabling secure sharing and use of health and genomic data essential for personalised medicine.

[11] The Leading laboratory for new health solutions. Ministry of Foreign Affairs of Denmark, Invest in Denmark. Available at: https://investindk.com/set-up-a-business/life-sciences
[12] Denmark has the best pharma and biotech industry in Europe. Ministry of Foreign Affairs of Denmark, Invest in Denmark. Available at: https://idk.editor.um.dk/set-up-a-business/life-sciences/pharma-biotech
[13] Life Science. Innovation Centre Denmark. Available at: https://icdk.dk/areas-of-expertise/life-science
[14] Denmark the top EU destination for innovation performance. Ministry of Foreign Affairs of Denmark, Invest in Denmark. Available at: https://investindk.com/insights/denmark-the-top-eu-destination-for-innovation-performance

- Danish Society for Personalized Medicine (Dansk Selskab for Personlig Medicin) promotes scientific collaboration and clinical implementation of personalised medicine across disciplines; supports education, networking, and policy input.
- Danish Medical Association (Lægeforeningen) represents medical professionals and contributes to the ethical, legal, and clinical aspects of implementing personalised medicine in practice.
- Danish Ethical Council (Det Etiske Råd) advises government and the public on ethical issues in medicine and biotechnology, including those raised by personalized and genomic medicine.

ACADEMIA

- University of Copenhagen (UCPH) offers a Master's in Personalised Medicine designed for employees in the healthcare sector, the Life Science industry, and public authorities who want to gain new skills to develop the use of health data and personalized medicine in their work.
- University of Copenhagen (UCPH) offers a Master's in Bioinformatics through its Bioinformatics Centre, focusing on computational analysis of genomics and high-throughput data—key skills for precision medicine.
- University of Copenhagen (UCPH) also runs the MSc in Molecular Biomedicine, combining molecular biology, genomics, and clinical research training with relevance to translational medicine.
- Under UCPH's BRIDGE programme, the BRIDGE Omics Translational Excellence Programme delivers postdoctoral training in genomics, proteomics and multi-omics analysis, with direct emphasis on personalised medicine applications.
- University of Southern Denmark (SDU) hosts a Precision Medicine research area within its Applied AI and Data Science group, developing genomics-, proteomics- and metabolomics-based approaches to tailor diagnostics and treatment.
- University of Southern Denmark (SDU) also offers a PhD-level Research Training Programme in Bioinformatics, geared toward computational methods for precision medicine, systems biology, and large-scale omics data analysis.
- University of Southern Denmark (SDU) provides a Master's in Computational Biomedicine, integrating bioinformatics and computational biology education across genomics, proteomics and translational medicine.
- Technical University of Denmark (DTU) offers a continuing education course in Computational Precision Medicine, teaching computational tools for patient stratification and cancer immunotherapy target identification.
- Aarhus University hosts the Professional Master's Degree in Personalised Medicine, a part-time program launched in 2021 in partnership with UCPH, SDU, Aalborg University, and DTU, designed for healthcare, technical, and science professionals to build cross-disciplinary skills and accelerate implementation of personalized care strategies.
- Aarhus University, through its Department of Biomedicine, offers a "Genetics and Personalised Medicine" module at bachelor level—covering foundational genetics, translational frameworks, and big-data analysis applied to diagnosis and personalized treatment approaches.

RESEARCH CENTERS

- National Genome Center (Nationalt Genom Center) supports genome sequencing in clinical practice, data infrastructure, and ethical/legal frameworks.
- PERSIMUNE (Centre for Personalised Medicine of Infectious Complications in Immune Deficiency) focuses on personalised medicine in infectious disease and immune system disorders. It integrates clinical, genomic, and real-world data for personalized treatment of immunocompromised patients.
- Danish Bio– and Genome Bank (RBGB – Regionernes Bio- og GenomBank) collects and manages biological samples and associated genomic data to support research and clinical use in personalized and precision medicine.
- Pioneer Centre for SMARTbiomed (Aarhus University hub with branches at UCPH and Oxford) develops statistical and computational methods for analyzing large-scale biomedical data—including genomics and register data—to enable precision medicine and support an international training environment in health data research.
- National Research Center under the Danish Comprehensive Cancer Center (DCCC) focuses on individualised treatment of acute myeloid leukemia (AML) and myelodysplastic syndrome (MDS), using patient-specific molecular profiling, drug screening and national clinical coordination to ensure equitable access to precision therapies.
- Novo Nordisk Foundation Center for Protein Research (University of Copenhagen): focused on systems biology and proteomics, the centre develops protein-targeted insights—relevant for biomarker discovery and customised drug development.
- Statens Serum Institut (SSI) is a Denmark's public health institute that conducts translational research on infectious diseases, genomic epidemiology, vaccines, and outbreak genetics—supporting personalised prevention and response strategies.

2. Existing Legal Framework

PRIMARY USE OF HEALTH DATA

The primary use of health data refers to the collection of personal data directly from a patient. Primary use of health data is typically obtained by a healthcare provider or professional in order to provide care, such as treatment, prescriptions or medicinal products, and/or provide necessary administrative, social, or reimbursement services.[15] In Denmark, the Ministry of Health and multiple subordinate agencies oversee the primary use of health data. Subordinate agencies include the Danish Health Authority, Danish Medicines Agency, Danish Patient Safety Authority, Danish Health Data Authority, and National Committee on Research

[15] My rights over my health data, 2025. European Commission: Public Health. Available at: https://health.ec.europa.eu/ehealth-digital-health-and-care/my-rights-over-my-health-data_en

Health Ethics.[16] Primary health data is predominately governed by the Danish Health Act (*Sundhedsloven*), the Act on Processing of Personal Data (*Persondataloven*), and the General Data Protection Regulation (GDPR).[17-18] The GDPR is a European Union (EU) law that was established in 2018, targeted toward the regulation of personal data of EU residents by organizations located within and outside the EU.[19] Denmark supplements this law through the Danish Data Protection Act (*Databeskyttelsesloven*), which not only protects and processes personal data usage in Denmark, but also covers the grey areas where the GDPR may not.[20]

The primary use of health data in Denmark has significantly advanced through digitalisation. The primary driver behind this is telemedicine. Telemedicine (or Telehealth) is a technological approach to the healthcare system which focuses on improving the quality of healthcare by requiring patients to provide medical information to receive appropriate care.[21] Denmark has been focusing on complete digital integration of health data throughout over the last several years and have become one of the most digital health systems in the world.[22]

The list below indicates the status of digital maturity of the healthcare system in Denmark:

- Patient summaries – fully digitalised
- Electronic prescriptions (ePrescription) – fully digitalised
- Electronic dispensations (eDispensing) – fully digitalised
- Medical images and image reports – partially digitalised
- Laboratory results – fully digitalised
- Discharge reports – fully digitalised

As of 2023, Denmark has an eHealth (electronic health) maturity score of 98%, which is much higher compared to the EU-27 average of 79%.[23]

SECONDARY USE OF HEALTH DATA

The secondary use of health data refers to the reuse of health data for public health, research, innovation(s), personalised medicine, and policy-making purposes. It is beneficial as it helps identify disease or specific health trends among a population, aids in the development of treatment, and contributes to the improvement of care. Additionally, the data can be used again by the public and professionals if they follow the European

[16] Schmidt M, Schmidt SAJ, Adelborg K, et al. The Danish health care system and epidemiological research: from health care contacts to database records. *Clinical Epidemiology*. 2019;Volume 11(1):563-591. Available at: https://doi.org/10.2147/clep.s179083
[17] Data Protection Policy, 2018. Sundhedsdatastyrelsen.dk. Available at: https://english.sundhedsdatastyrelsen.dk/contact/data-protection-policy
[18] Hartlev M. *Overview of the National Laws on Electronic Health Records in the EU Member States: National Report for Denmark*. Milieu Ltd and Time.lex; 2014. Available at: https://health.ec.europa.eu/document/download/adaaa3b6-b336-4e65-8897-2b05a689f193_en#:~:text=The%20general%20data%20protection%20rules%20apply%2C%20and,public%20and%20the%20private%20health%20care%20services.&text=The%20Danish%20Data%20Protection%20Agency%20(Datatilsynet)%20is,the%20Act%20on%20Processing%20of%20Personal%20Data
[19] What is GDPR? IBM. Available at: https://www.ibm.com/cloud/compliance/gdpr-eu
[20] Data protection laws in Denmark - Data Protection Laws of the World, 2025. DLA Piper. Available at: https://www.dlapiperdataprotection.com/?t=law&c=DK
[21] Henriksen HE. Denmark - a telehealth nation, 2019. *Healthcare Denmark*. Available at: https://healthcaredenmark.dk/media/0epij4ws/denmark-a-telehealth-nation.pdf
[22] Bærentsen OÁH, Wiisbye P, Hansen AV. *Digitalisation in Danish Healthcare*.; 2024. Available at: https://healthcaredenmark.dk/media/sghmh0in/digitalisation_2024_onlineversion.pdf
[23] European Commission: Directorate-General for Communications Networks, Content and Technology, Capgemini Invent, Page, M., Winkel, R., Behrooz, A. et al., *2024 digital decade ehealth indicator study – Annex – Country factsheets*, Publications Office of the European Union, 2024. Available at: https://data.europa.eu/doi/10.2759/276133

Health Data Space (EHDS) regulation. [24] In Denmark, this practice is also governed by the GDPR to ensure that health data is protected and utilized appropriately.

Although there are regulations in place for the usage of secondary health data, Denmark still faces challenges as it causes significant limitations. This includes the ability to collaborate with global and industry stakeholders, the attitude of the population due historical factors, and institutional structures.[25] Additionally, there is no centralised metadata catalogue that offers a broad overview of health-related data collections and access procedures.[26]

Categories of Electronic Data Available for Secondary Use in Denmark:[16]

- The Danish Health Data Authority
- The Danish Clinical Quality Registries (RKKP)
- Statistics Denmark
- The biobanks and National Genome Centre

PATIENTS' RIGHTS

Patients' rights in Denmark are protected under The Health Act. The Health Act in Denmark covers all the rules that apply to Danish residents and patients, and healthcare professionals when they utilise or interact with the healthcare system. This act protects the fundamental rights and dignity of a patient, the right to make their own decisions concerning their health, enforces confidentiality, and promises timely treatment. Furthermore, The Health Act also covers a patient's right to the access of their medical records. This includes the right to see it, obtain copies, and the obligation that healthcare professionals must ensure proper documentation.[27]

ATMPs REGULATION

Advance Therapy Medicinal Products (ATMPs) are biological medicinal products that are based on cells, tissues, and genes, such as somatic cell therapy medicinal products, gene therapy medicinal products, combined advanced therapy medicinal products, and tissue engineered products. The regulation of ATMPs in Denmark is aligned with the European Union's standards, particularly Regulation 2007/1394/EC. The regulation includes a framework for the requirements of authorizing manufacture medicines, clinical trials, compassionate use permits, pharmacovigilance, legislation, and other crucial responsibilities.[28]

[24] European Commission. Reuse of health data. European Commission: Public Health, 2025. https://health.ec.europa.eu/ehealth-digital-health-and-care/reuse-health-data_en#:~:text=When%20health%20data%20is%20reused%20for%20research%2C,the%20European%20Health%20Data%20Space%20(EHDS)%20regulation

[25] Martani A, Egli SM, Geneviève LD, Elger BS, Wangmo T. A role-model for data policies? Qualitative study on the governance of health data in Denmark. *Health Policy and Technology*. 2022;11(4):100683. doi:10.1016/j.hlpt.2022.100683

[26] The Health Programme of the European Union. Country Visit – Denmark, 2023. Available at: https://tehdas.eu/app/uploads/2023/03/denmark-country-visit-factsheets-10-2022.pdf

[27] What are your options and rights as a patient? Capio Private Hospital, 2024. Available at: https://capio.dk/en/praktisk-information/muligheder-og-rettigheder/

[28] Danish Medicines Agency. Regulation of innovative medicinal products including ATMP, 2025. Available at: https://laegemiddelstyrelsen.dk/en/special/regulation-of-innovative-medicinal-products-including-atmp/

3. Innovation Agenda in the Field

OVERVIEW OF NATIONAL AND REGIONAL INNOVATION AGENDAS

Personalised medicine is an important concept in the EU as it addresses the challenges that European healthcare systems face. This includes the increasing costs of healthcare due to the growing prevalence of non-communicable diseases (NCDs) and standard medications not being effective for treating a high-volume of patients.[29] However, for personalised medicine to thrive and be effective, it is dependent on the approach style and environment. Denmark is a positive example of this. For instance, recent studies analysed personalised medicine in Denmark, and it showed that the country has the most supportive environment for personalised medicine in the EU since 2017. This is a result of the framework conditions for health research, efficient public authorities and case handling, the recognition of the positive correlation between personalised medicine, health data, and population health, and its commitment to improving the Danish population health.[16] Therefore, this has earned Denmark the title of being known as one of the most advanced countries for longitudinal disease research.[30] Denmark's innovation agenda in personalised medicine is supported at both national and regional levels by the Danish Ministry of Health and the Danish Regions.[31] The innovation agenda in personalised medicine maintains a strong focus on patient and clinical needs, and health data through various approaches.[32] This includes utilising national biobanks, genetic databases, and extensive Danish registers.[33]

The current infrastructure and initiatives revolve around Denmark's principles and focus areas of personalised medicine. The Danish national strategy for personalised medicine 2025-2027 (currently the latest one) highlights these principles:

1. **Put the patient first** – ensure that patient preferences, values, and life situation actively shape prevention and treatment.
2. **Strengthen research frameworks** – create stronger conditions for research in personalised medicine so new knowledge is quickly translated into patient benefit.
3. **Make Denmark a leader in advanced therapies (ATMPs)** – position Denmark among Europe's leading countries in developing, testing, and offering advanced therapies, ensuring faster access to effective treatments.
4. **Free up resources and improve quality** – enhance treatment quality and achieve more cost-effective use of healthcare resources through data-supported prevention and treatment.
5. **Strengthen biobanks and health data infrastructures** – ensure health data can be used more efficiently and across sectors, benefiting both patients and top-class international research.
6. **Use health data and AI wisely** – harness the potential of Danish health data and artificial intelligence to tailor treatments more precisely for individuals.

[29] European Commission. Personalised medicine. European Commission: Research and Innovation, 2023. Available at: https://research-and-innovation.ec.europa.eu/research-area/health/personalised-medicine_en

[30] Ministry of Foreign Affairs of Denmark. Realizing the potential of personalized medicine. Invest in Denmark. Available at: https://investindk.com/set-up-a-business/personalized-medicine

[31] The Danish Ministry of Health. Personlig medicin til gavn for patienterne: klar diagnose, målrettet behandling, styrket forskning : national strategi for personlig medicin 2017-2020, 2016. Available at: https://www.eng.ngc.dk/Media/637614364621421665/Danish%20Strategy%20for%20personalised%20medicine%202021%202022.pdf

[32] Nationalt Genom Center. Danish Strategy for Personalised Medicine 2021-2022. Available at: https://www.eng.ngc.dk/about-the-danish-national-genome-center/national-strategy-for-personalised-medicine-2021-2022

[33] Aarhus University. The Personalised Medicine Network, 2024. https://health.au.dk/en/the-personalised-medicine-network

7. **Expand personalised medicine across the healthcare system** – extend access so that many more patients benefit from personalised medicine.

Compared with the older version, it broadens the scope beyond genomics and focuses more on implementation, data use, and advanced therapies.[34]

CURRENT INFRASTRUCTURE AND INITIATIVES

- **The Danish National Genome Center (DNGC)** is a government agency that was developed to implement the National Personalised Medicine Strategy in Denmark. It was first established in 2018 and was one of the first initiatives in the Danish national strategy for personalised medicine.[35] The main goals of the DNGC are to create more precise diagnosis, develop individualised and targeted treatment, and strengthen research within the national healthcare system.[36] Since the implementation of the agency, they have been responsible for and overseeing the joint and national infrastructure for personalised medicine. This includes a national infrastructure for performing genome sequencing and storing of information in a national genome database, and a national research infrastructure supporting the future development of personalised medicine.[37]
- **ATMP Denmark** is a national collaboration structure that aims to promote the development and implementation of advanced therapies in the healthcare system. The collaboration has been established by the Ministry of the Interior and Health, the Danish Regions and Amgros in association. The collaboration spans across regions, universities, the pharmaceutical industry and relevant authorities. The goal is to make Denmark a pioneer in advanced therapies and ensure Danish patients have access to new and potentially curative treatments for serious and rare diseases.[38]
- **The Danish National Biobanks** are a valuable component of as they support multiple aspects in personalised medicine. They not only support scientific progress in areas of biomarker discovery and population stratification, but this also aids and encourages the development of personalised medicine. Biobanks are essential for personalised medicine as they have positivity effected patient preventive care, prediction, post-care, and enhanced confidence in the healthcare system. The overall goal of the Danish national biobanks is to provide safe, transparent, and easy access to biological materials, and to create an infrastructure that supports research and diagnostics. Biological materials consist of specimens stored in the biobanks and enable the ability to combine them with demographic and clinical data from population-based databases,

[34] Ministry of the Interior and Health. Strategi for personlig medicin 2025–2027, 2025. Available at: https://www.ism.dk/Media/638924859293251124/Strategi-for-personlig-medicin-2025-2027-TILG.pdf

[35] Beedholm-Ebsen R. The Danish Approaches for Personalised Medicine - For the Benefit of Patients. International Pharmaceutical Industry: Drug Discovery, Development, and Delivery. 2021;13(1). Available at: https://international-pharma.com/wp-content/uploads/2021/04/The-Danish-Approaches-for-Personalised-Medicine-%E2%80%93.pdf

[36] Vangelis. Danish National Genome Center Partners with Lifebit to Deliver Personalised Medicine Nationwide – Lifebit, 2025. Available at: https://lifebit.ai/blog/danish-national-genome-center-partners-lifebit/#:~:text=The%20Danish%20National%20Genome%20Center%2C%20a%20government,the%20Danish%20Government's%20National%20Personalised%20Medicine%20Strategy

[37] Nationalt Genom Center. Genomic Medicine Sweden and the Danish National Genome Center sign a new collaboration agreement to strengthen the development of personalised medicine in Sweden and Denmark. Nationalt Genom Center, 2024. Available at: https://www.eng.ngc.dk/news/2024/december/genomic-medicine-sweden-and-the-danish-national-genome-center-sign-a-new-collaboration-agreement-to-strengthen-the-development-of-personalised-medicine-in-sweden-and-denmark#:~:text=About%20Danish%20National%20Genome%20Center%20The%20Danish,supporting%20the%20further%20development%20of%20personalised%20medicine.

[38] Amgros. NATIONAL COOPERATION REGARDING AVANCED THERAPY MEDICINAL PRODUCTS (ATMP DENMARK, 2025. Available at: https://amgros.dk/about-amgros/news/national-cooperation-regarding-avanced-therapy-medicinal-products-atmp-denmark/

such as the civil registration number.[39] While there is only one national biobank in Denmark, there are currently over 200 local biobanks throughout the country.[40]

PRIORITIES AND BARRIERS OF INNOVATION AGENDA

Main Priorities of Innovation Agenda:

- Progress toward offering genetic analysis more throughout the population.
- Improving international and national collaboration.
- Create vital interpretation and analysis tools for healthcare professionals.
- Utilise collected genetic information for research.
- Focus on what benefits the patients immediately.
- Public control over the usage of patient information.
- Better diagnostics and more targeted treatment.
- Equality in personalised medicine so every citizen receives the same offer, regardless of where they are in the country.
- Ensure that technologies provide critical information regarding the human genome, and aid in the process of improving and developing new treatments.[41]

Main Barriers of Innovation Agenda:

- Low numbers regarding diagnoses based on whole genome sequencing.
- Sequencing only takes places exclusively in the public healthcare system.
- Lack of clinical utilisation.
- Lack of other stakeholders in the further development of personalised medicine and data usage.
- Lack of investments in infrastructure and competencies.[40]

STATE OF IMPLEMENTATION

Personalised medicine in Denmark has made significant strides but still has key areas to focus on. Denmark's current vision of personalised medicine includes creating targeted prevention, diagnostics, and treatment to each patient by utilising databases as mentioned previously. Denmark's advantage to their vision is that they have been collecting data for over the last 40 years and have previously used it for healthcare research and treatment. However, they acknowledge that there must be a stronger foundation and significant improvement for the collection and storage of health information.[42]

[39] Laugesen K, Mengel-From J, Christensen K, et al. A review of major Danish biobanks: Advantages and Possibilities of health research in Denmark. *Clinical Epidemiology*. 2023;Volume 15:213-239. doi:10.2147/clep.s392416

[40] BBMRI-ERIC. Denmark - BBMRI-ERIC. BBMRI-ERIC, 2025. Available at: https://www.bbmri-eric.eu/national-nodes/denmark/#:~:text=There%20are%20more%20than%20200%20local%20biobanks,samples%20in%20both%20existing%20and%20future%20collections

[41] Lundgren B. *Thoughts on Personalised Medicine*.; 2023. Available at: https://www.eng.ngc.dk/Media/637873528002809965/NGC%20-%201000%20thoughts%20on%20personalised%20medicine.pdf

[42] Handley E. Denmark: Moving towards personalised medicine. Open Access Government, 2022. Available at: https://www.openaccessgovernment.org/danish-initiative/129461/

4. SWOT Analysis

STRENGTHS	WEAKNESSES
• High digital maturity: Denmark has one of the most digitised healthcare systems globally, with integrated Electronic Health Records (EHRs) and national registries. • Robust public infrastructure: strong national institutions like the National Genome Center. • Strong political commitment: national strategies (e.g. 2017–2022 PM strategy, 2025-2027 PM strategy) and significant public investment support long-term vision. • Collaborative research ecosystem: networks like the Personalised Medicine Network (Aarhus University) and participation in international projects enhance scientific collaboration.	• Workforce skills gaps: many clinicians and healthcare professionals lack adequate training in genetics, data interpretation, and PM approaches. • Limited clinical integration: despite strong research, full-scale implementation of genomics and PM into routine care is still limited. • Underrepresentation in data: existing datasets underrepresent certain groups (e.g. minorities, rare disease patients), limiting equity. • Dependence on external tools: some bioinformatics, AI, and analytics capabilities still rely on international partnerships or imported platforms.
OPPORTUNITIES	**THREATS**
• EU-Level Collaboration: engagement in Horizon Europe and similar programs offers opportunities to shape and access pan-European PM infrastructure and standards. • Nordic Cooperation: Denmark could lead or co-develop shared biobanking, EHR access, and AI development across the Nordics. • Prevention and Early Detection: expanding PM from treatment to prevention could reduce disease burden and costs, especially for cancer and chronic diseases. • Talent Development: scaling interdisciplinary programs (bioinformatics,	• Data privacy and ethical concerns: high sensitivity around genetic data may slow adoption or trigger public resistance without robust governance. • Sustainability of Funding: Some PM efforts depend on time-limited EU or public grants, long-term funding mechanisms are not always secure. • Regulatory lag: innovation (e.g. AI, multi-omics) is outpacing regulatory and ethical adaptation, creating uncertainty in clinical adoption. • Overreliance on big pharma & tech: there is some risk that public interest could be

health data science, genomics) will boost readiness for PM at all levels.	overshadowed by private-sector priorities without clear frameworks for equitable benefit-sharing.

5. Transferable Good Practices

THE DIGITAL HEALTH CENTRE

The Digital Health Centre focuses on key projects sponsored by the Health Innovation Centre of Southern Denmark, which is a partnership between the southern region of Denmark, municipalities, and patient associations. The project focuses on providing digital services to Danish citizens who have chronic diseases or are in need of support to develop or gain health habits. The digital services that the center offers includes but is not limited to enhancing the management of chronic diseases, encouraging positive and healthy habits, and promoting and improving health literacy. Chronic diseases include chronic obstructive pulmonary disease (COPD), cardiovascular disease, and diabetes, and lifestyle changes can include pain management, and quitting smoking. The goal of the project is to ensure maximum resource utilisation while facing healthcare staff shortages and the significant increasing number of chronic diseases among the Danish population. The key projects by the Digital Health Centre include digital patient education, digital diabetes, digital skills for health professionals, health together from home, MeMoS, skills for digital leadership, and cancer rehabilitation: regaining strength.[43]

NATIONAL WHOLE GENOME SEQUENCING CENTER

The Danish National Genome Center focuses on developing, operating, and enhancing the national infrastructure for personalised medicine through several initiatives, such as the National Whole Genome Sequencing Center, and the National High Performance Computing Center. The National Whole Genome Sequencing Center (National WGS Center) focuses on providing access to standardised, cost-effective, and high-quality whole genome sequencing (WGS) for clinical diagnostics. This initiative focuses on covering and supporting the entire population of Denmark, which consists of 5.9 million residents. The center has partnered with highly specialised laboratory facilities to promote the national implementation of WGS in patient care. These facilities include the department of molecular medicine (MOMA) at Aarhus University Hospital in the Central Jutland (WGS West) and Genomic Medicine (GM) at Rigshospitalet in the Capital Region (WGS East). Through the National WGS Center, there has been multiple investments into personnel, reagent kits, and machines. Furthermore, the center and its partnered facilities perform whole genome sequencing for patients who are not covered by the Danish National Genome Center. This has helped increase the number of genome sequencing, which has helped make significant progress toward Denmark achieving its goals associated with personalised medicine. The National WGS Center provides patients and healthcare providers with clear and

[43] The Digital Health Centre. Health Innovation Centre of Southern Denmark. Available at: https://syddansksundhedsinnovation.dk/en/projects/2024/the-digital-health-centre

understanding diagnosis(es), improves targeted treatment, and reduces the turnaround time from sample to the release of data for interpretation.[44]

NATIONAL HIGH PERFORMANCE COMPUTING CENTER

The National High Performance Computing Center (National HPC Center) is an initiative by the Danish National Genome Center that has the responsibilities of creating services, tools and data available, and it is targeted at providing better support for healthcare providers treatment of patients in hospitals and for research in personalised medicine. Although the National HPC Center is led by the Danish National Genome Center, they have collaborated with the Technical University of Denmark and University of Copenhagen. The National HPC Center's main goals include providing equal access to services and tools for clinicians, researchers, and strategic partners throughout Denmark. Services include high performance computing power and validated pipelines for the processing of genome data, interpretation tools and databases for interpretation support, and a national genome database.[43]

AI-POWERED PERSONALISED DRUG DISCOVERY

Denmark showcases a prime example of personalised medicine excellence through the cutting-edge collaboration between NVIDIA, Novo Nordisk, and DCAI utilising the national Gefion AI supercomputer. This partnership uses state-of-the-art AI—from generative models to "agentic" workflows—to revolutionise drug discovery. Novo Nordisk researchers are applying tailored AI models (via NVIDIA's BioNeMo, NIM, NeMo, and Omniverse platforms) to predict single-cell responses, design novel drug-like molecules, and mine scientific literature for gene–protein–disease insights.

Powered by Gefion—a 1,528-GPU NVIDIA DGX SuperPOD hosted by the Danish Centre for AI Innovation and funded by the Novo Nordisk Foundation—Denmark now operates a sovereign "AI factory" for healthcare. This infrastructure not only supports pharmaceutical R&D but also accelerates broader national initiatives, such as unified health-data platforms and real-time hospital AI systems, exemplified by Teton's 25 % reduction in nightshift workloads.

This collaboration highlights Denmark's robust infrastructure and strategic synergy between government, academia, foundations, and industry—positioning the country as a global leader in AI-driven, personalised drug development.[45]

[44] Enabling personalised medicine for the benefit of patients. Danish National Genome Center, 2023. Available at: https://www.ngc.dk/Media/638493695691274048/NGC%20%C3%85rsrapport%202023%20WEB%20(1).pdf

[45] NVIDIA. NVIDIA Partners With Novo Nordisk and DCAI to Advance Drug Discovery, 2025. Available at: https://nvidianews.nvidia.com/news/nvidia-partners-with-novo-nordisk-and-dcai-to-advance-drug-discovery

6. Good Practices Related to Gender Diversity and Inclusiveness

WOMEN IN STEM INITIATIVES

Denmark has made significant efforts to promote gender diversity and encourage women's participation in science, technology, engineering, and mathematics (STEM). Women in Denmark make up a small percentage of STEM graduates, and it is crucial that the country focuses on promoting gender diversity. For example, approximately 34% of STEM graduates in Denmark is women.[46] Nordic Women in STEM is an initiative based in the Nordic region of Europe that focuses on exposing girls, primarily during their adolescence years, to be exposed to STEM and to ensure that they have women role models to look up to. Their overall goal is to change the way girls view STEM fields and encourage them to recognize that they have the same opportunities.[47]

The Danish Society for Women in Science (DANWISE) is a non-profit organization that focuses on addressing gender inequality throughout the country by representing women from academia and industry within humanity and STEM fields. The organization strives for gender equality, equal opportunities and rights for the Danish population.[48] Denmark has been focusing on how to find ways to inspire and encourage the next generation of women throughout the country.

WOMEN ENTREPRENEURS IN HEALTHCARE

The proportion of women entrepreneurs versus male entrepreneurs is concerning in Denmark. For example, in 2022, 16% of men were considering starting a business whereas only 7% of women were considering it. The percentage of employed women in the country who are self-employed with employees or are own-account workers is one of lowest among the countries involved in the Organisation for Economic Co-operation and Development (OECD). In 2022, Denmark was way below the average number of female entrepreneurs per male entrepreneur in OECD countries, recognizing the challenges that women in Denmark face.[49]

However, Denmark has implemented several initiatives to support women entrepreneurs in the healthcare sector. Innovation Fund Denmark aims to create a gender balance among Danish researchers and entrepreneurs through an initiative called Innowomen. Innowomen focuses on highlighting and promoting female role models in research and entrepreneurship by appointing four new members to the group every year. The four members (females) represent various professional experiences and career fields to showcase diversity, ideas, growth, and innovation. The Innowomen project was created based on reports conducted on the Danish labour market, which highlighted the poor balance between men and women in the labour market.[50]

[46] Nordic Women in STEM. Available at: https://www.nordicwomeninstem.com/
[47] ABOUT US | Nordic Women in STEM. Available at: https://www.nordicwomeninstem.com/about-3
[48] Aarhus University. DANWISE strives for gender equality, equal rights and opportunities in Denmark, 2020. Available at: https://international.au.dk/currently/news/preview/artikel/danwise-strives-for-gender-equality-equal-rights-and-opportunities-in-denmark-1
[49] *Briefing for the FEMM Committee mission to Denmark: 15-17 May 2023.*; 2023. Available at: https://www.europarl.europa.eu/RegData/etudes/BRIE/2023/748892/IPOL_BRI(2023)748892_EN.pdf
[50] Innovation Fund Denmark appoints new Innowomen | Innovationsfonden, 2023. Available at: https://innovationsfonden.dk/en/news/innovation-fund-denmark-appoints-new

Women in Life Science Denmark (WiLD) is another initiative centered on creating a networking forum for professional sharing for women in the life science industry. Their overall goal is to strengthen the value creation in Denmark's life sciences sector, increase diversity in management and specialist levels, and encourage women to pursue professional roles. They offer mentor programs, 4 annual networking meetings, an expert panel, and inspirational lectures.[51]

The BioInnovation Institute (BII)—collaborating with Science Translational Medicine—launched a Translational Medicine Prize for Innovations in Women's Health, aimed specifically at advancing research that addresses sex- and gender-specific health needs (e.g. gynaecological diseases, reproductive health, maternal care, and gendered differences in disease presentation). This initiative explicitly recognises and supports innovations tailored to women's and gender medicine, helping correct sectoral gaps and encouraging inclusive personalised medicine innovation.[52]

GENDER EQUALITY IN EDUCATION

The European Institute for Gender Equality focuses on promoting gender equality in academia and research throughout the European Union. In Denmark, this includes fulfilling the requirements of the Gender Equality Act. The Gender Equality Act was implemented in 2000 and it requires universities, research organisations, and public authorities to work toward promoting gender equality and to incorporate it in administration and relative planning. Additionally, the act does more than just fostering gender equality. It promotes equal participation, influence, and opportunities in all aspects of society to ensure equal value of all genders. In addition to the act, Denmark has other initiatives to support the law. This includes the Equal Treatment Act, a ministerial order on the content of job advertisements, and public institutions at all levels required to report on their gender equality initiatives to the government.[53]

Another good practice is promoting gender balance in early research talent. At the University of Copenhagen's Faculty of Health and Medical Sciences, the Independent Research Fund Denmark's 'Inge Lehmann Programme' awarded DKK 18 million to six female early-career researchers working in areas related to oncology, biotechnology, public health, and protein research. The goal is to tackle gender imbalance in scientific environments and foster talent diversity—ensuring a broader pool of perspectives contributing to personalised medicine across disciplines.[54]

Potential Synergies with Other EU Regions

EXISTING MULTI-REGIONAL PROJECTS AND INITIATIVES

Program, project	Countries	Focus Areas	Focus activities and outcomes

[51] Women in Life Science Denmark. Available at: https://womeninlifescience.dk/
[52] Society for Reproductive Investigation. Women's Health Innovation Prize. Available at: https://www.sri-online.org/events/news/womens-health-innovation-prize
[53] Denmark. European Institute for Gender Equality, 2025. Available at: https://eige.europa.eu/gender-mainstreaming/toolkits/gear/legislative-policy-backgrounds/denmark
[54] University of Copenhagen. Diversity in research strengthened by millions in funding for female researchers, 2024. Available at: https://healthsciences.ku.dk/newsfaculty-news/2024/12/diversity-in-research-strengthened-by-millions-in-funding-for-female-researchers/

P4Health[55]	Austria, Belgium, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Italy, Netherlands, Poland, Portugal, Spain, Sweden	Predictive, Preventive, Personalised, and Participatory healthcare	P4Health aims to develop and implement solutions essential for personalised medicine, including new diagnostic methods and more affordable therapies. The outcomes include advancements in personalised healthcare technologies and improved patient care through innovative diagnostic and therapeutic methods.
ERA PerMed[56]	Austria, Belgium, Canada, Croatia, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Israel, Italy, Latvia, Luxembourg, Norway, Poland, Romania, Slovenia, Spain, Sweden, The Netherlands, Turkey	Pharmaco-genomics and personalised prevention	Coordination of transnational research in personalised medicine, particularly pharmacogenomics. Projects aim to identify drug-response biomarkers, improve dose prediction, and personalise treatment pathways. It is expected that collaborative R&D efforts involving Danish institutions (with funding from Innovation Fund Denmark) will improve clinical implementation of pharmacogenetics and align with EU and national health priorities through co-funded projects.
ELIXIR[57]	Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Israel, Italy, Luxembourg, The Netherlands, Norway, Portugal, Slovenia, Spain, Sweden, Switzerland, UK	Life science data infrastructure	ELIXIR fosters collaborations both within Europe and globally to advance bioinformatics. ELIXIR's partnerships focus on data sharing, standardisation, and resource development to support life science research. It is crucial for addressing the challenges of managing and analysing the increasing volume of data generated in publicly funded research.
EIT Health[58]	EU member states, Israel, Switzerland, UK	Health innovation and entrepreneurship	Key activities include the Transformative Health Instrument Call, which provides funding for high-potential healthcare startups, and the Deep Tech Venture Builder

[55] Sagner M, McNeil A, Puska P, et al. The P4 Health Spectrum - A Predictive, Preventive, Personalized and Participatory Continuum for Promoting Healthspan. Prog Cardiovasc Dis. 2017;59(5):506-521. Available at: https://indico.cern.ch/event/679940/attachments/1570151/2476483/P4-Health-Spectrum-2017.pdf
[56] ERA PerMed. Available at: https://erapermed.isciii.es/
[57] Elixir. Available at: https://elixir-europe.org/
[58] EIT Health. Available at: https://eithealth.eu/

			Programme. Outcomes include the development and commercialization of innovative healthcare solutions, improved healthcare delivery, and strengthened European healthcare systems
EURORDIS[59]	74 countries, primarily in Europe	Rare diseases advocacy and support	EURORDIS advocates for people living with rare diseases, providing training and education through the EURORDIS Open Academy, and gathering patient insights via the Rare Barometer Programme. Key initiatives include Rare Disease Day, the EURORDIS Black Pearl Awards, and the European Conference on Rare Diseases and Orphan Products. Outcomes include increased awareness, improved policies, and enhanced support for rare disease patients.
NordForsk[60]	Finland, Denmark, Island, Norway, Sweden	Societal and public health challenges	The research area seeks to generate knowledge on the effect of demographic, social, environmental and biological factors on human health and the challenges this implies for human welfare, and to translate this new knowledge into practical solutions in healthcare and welfare systems. These efforts could in the longer run lead to better specified disease classifications, more efficient cures for patients, better disease prevention and more efficient welfare systems.

MAIN AREAS FOR FUTURE DEVELOPMENT AND COLLABORATION

- Multiomics: to fully realise the potential of personalised medicine, Denmark can expand the use of genomics, proteomics, metabolomics, and microbiomics in routine care. National infrastructures like the National Genome Center can be further leveraged to integrate these layers of data for more precise diagnosis and treatment pathways.

[59] EURORDIS. Available at: https://www.eurordis.org/
[60] NordForsk. Available at: https://www.nordforsk.org/research-areas/nordic-initiative-health-and-welfare

- **AI driven initiatives:** with platforms like the Gefion supercomputer and collaboration with NVIDIA and Novo Nordisk, Denmark is poised to lead in AI-driven drug discovery and clinical decision support tools. There is strong potential to expand partnerships and create interoperable real-time AI applications in hospitals, especially for early detection, triage, and personalised treatments.
- **Prevention programs:** future development should focus on using personalized risk profiling (based on genetics, environment, and behavior) to enable preventive interventions at the individual and population levels. This aligns well with EU missions on cancer and noncommunicable diseases.
- **Health data projects:** with active participation in ELIXIR, ERA PerMed, and other EU initiatives, Denmark could take a leadership role in shaping EU-wide standards for data sharing, biobanking, and federated learning. There's room for deeper collaboration with Nordic and Baltic neighbours to build regional health data ecosystems.
- **Education and training:** as personalised medicine becomes more complex, there's a need to develop targeted education and training programs for clinicians, researchers, and health IT staff. Expanding university curricula and cross-disciplinary networks (like the Personalised Medicine Network at Aarhus University) will be essential.

7. Conclusions

POSITIVE DEVELOPMENTS

- Denmark has a highly digitised and integrated health system, with 98% eHealth maturity and robust national registries.
- It plays a central role in major EU and international networks, including ELIXIR, ERA PerMed, P4Health, and EIT Health.
- The country has established leading infrastructures like the National Genome Center, Whole Genome Sequencing Center, and High-Performance Computing Center and ecosystem players like Medicon Valley, Danish Life Science Cluster.
- Strategic public–private partnerships (e.g., NVIDIA–Novo Nordisk–Gefion AI) demonstrate strong capacity for AI-driven innovation in drug discovery and diagnostics.

GAPS AND CHALLENGES

- Genomics and multi-omics tools are not yet fully integrated into routine clinical practice, therefore healthcare professionals face skills gaps in genetics, data interpretation, and the application of PM tools.
- There are some regional disparities as well as underrepresentation of minority groups and rare disease patients, which limits the inclusivity of health data.
- Continued reliance on imported AI/bioinformatics solutions may limit national data sovereignty and innovation control.
- Data privacy concerns and ethical considerations could affect public trust and adoption.

IMPROVEMENT OPPORTUNITIES

- Strengthening clinical implementation pathways to bring research more effectively into everyday care.
- Expanding training and education programs in precision care, genomics, and health data science.
- Increasing investment in multi-omics infrastructure and tools for personalised prevention and early detection.
- Developing a renewed national strategy for personalised medicine beyond 2022, aligned with Horizon Europe and the European Health Union.
- Deepen Nordic and Baltic cooperation to build a unified regional ecosystem for personalised and precision health.