



Copenhagen Bioscience Cluster

a novo nordisk foundation initiative

International bioscience hub

The Copenhagen Bioscience Cluster is a Novo Nordisk Foundation initiative to establish world-class research centres and infrastructure within biomedicine and biotechnology and create an innovative framework for collaboration and synergy.

The Cluster has the following ambitions:

- to recruit highly skilled researchers and talent to Greater Copenhagen;
- to stimulate cross-pollination between academia, hospitals and industry;
- to increase the visibility of research and innovation in the region; and
- to contribute to a knowledge-based society.

All research centres are established in partnership with public universities and conduct independent research. Centres are supported for a minimum period of 10 years.

Since 2007, the Novo Nordisk Foundation has awarded grants of more than DKK 4 billion (€537 million) for establishing and expanding the Copenhagen Bioscience Cluster.

A life science environment

Greater Copenhagen provides multiple opportunities for interaction and collaboration, including:

- 22 hospitals, of which 11 are university hospitals;
- 11 universities, of which 4 have research within the biosciences;
- more than 250 life science companies; and
- 50,000 students within the biosciences.



● Current Cluster research centres and infrastructure

- Novo Nordisk Foundation Center for Protein Research
- Novo Nordisk Foundation Center for Basic Metabolic Research
- Novo Nordisk Foundation Center for Stem Cell Biology, DanStem
- Novo Nordisk Foundation Center for Biosustainability
- Danish National Biobank
- Cryoelectron microscope

● Universities

● University hospitals

● Largest R&D-based life science companies



Cross-fertilizing ideas

Focusing on research fields including proteins, stem cells, metabolism and biosustainability, the multi-expertise environment of the Copenhagen Bioscience Cluster offers a platform for cross-fertilizing ideas, leading to innovative interdisciplinary collaboration.

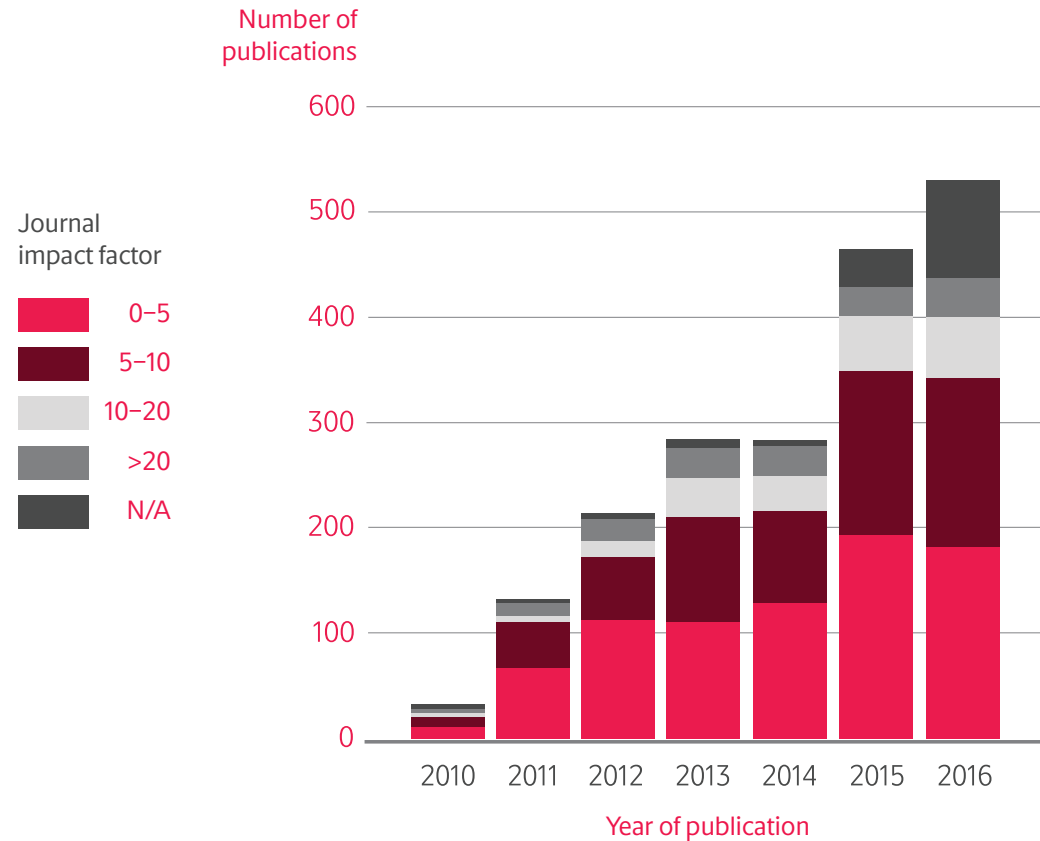
The state-of-the-art infrastructure of the Cluster enables researchers to benefit from sharing specialized equipment and methods, giving them more time to focus on scientific discovery.

Researchers in the Cluster collaborate with numerous partners in Denmark and with some of the most prominent research institutions in the world in both the public and private sector.

To further promote and encourage collaboration and synergy, the Novo Nordisk Foundation has initiated a range of supporting networking and knowledge-sharing activities, including cluster collaboration events, career days and the Copenhagen Bioscience Lectures.

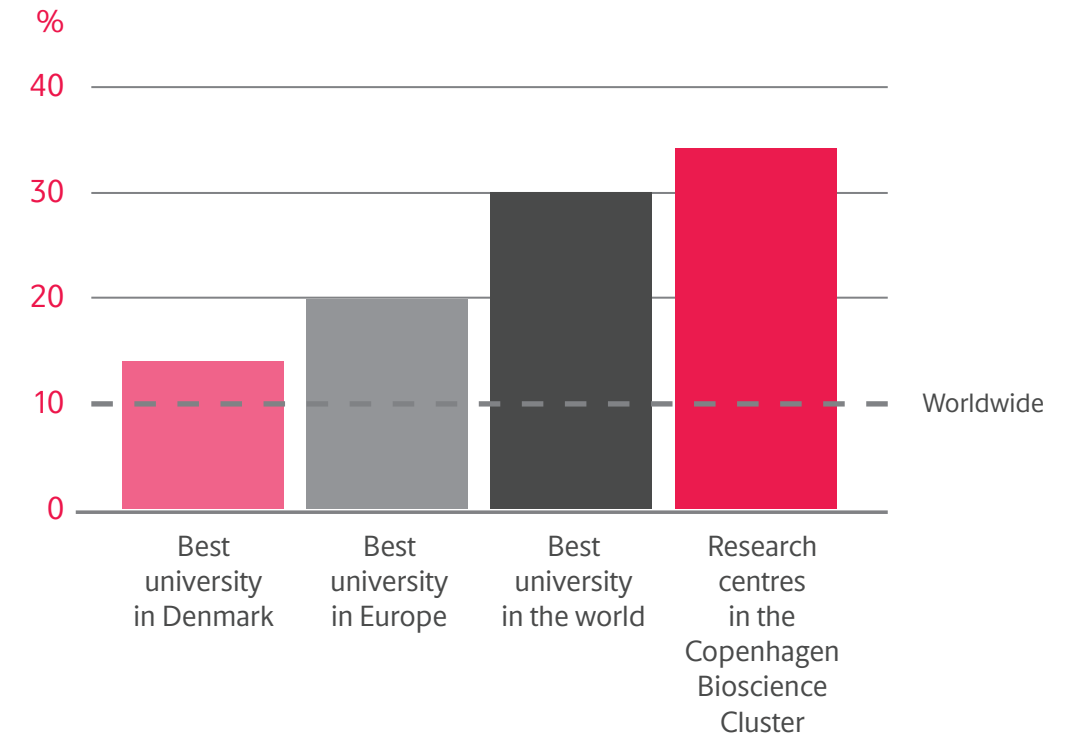
Research footprint

Impact of publications



Impact of publications of the four research centres in the Copenhagen Bioscience Cluster, 2010–2016: total number of research publications subdivided by journal impact factor.
N/A: journals for which the impact factor is not currently registered.

PPtop10%



Share of publications among the 10% most cited in the biomedical and health sciences (PPtop10%): the combined data for the four research centres in the Copenhagen Bioscience Cluster are from 2014, and the data for the universities are the average for 2011–2014 (CWTS Leiden Ranking).



Understanding diabetes and obesity

The overarching research goal of the Novo Nordisk Foundation Center for Basic Metabolic Research is to understand the causes of diabetes and obesity by studying the molecular mechanisms underlying the development of these metabolic conditions.

The Center's researchers investigate how the interaction between genes and environment affects the human metabolism, including the regulation of the body's energy expenditure and how factors such as gut bacteria and physical exercise affect metabolic health. The aim of these investigations is to create a basis for developing new ways of preventing and treating diabetes and obesity.

The Center focuses on the following aspects of how human genes and the environment influence metabolism:

- discovering and validating potential novel methods of treatment and prevention based on human genes and gut bacteria;
- using epigenetics and nutrient signalling to develop the molecular and cellular understanding of how changing people's diet, weight and level of physical activity can prevent and treat type 2 diabetes;
- studying hormones in the human gut and how they sense nutrients and metabolites as a basis for developing better ways

to treat people with type 2 diabetes and obesity; and

- developing new and innovative methods for imaging the regulation of glucose and fat metabolism by the human liver and muscles to study how this changes among people with insulin resistance and type 2 diabetes.

“ There is an exciting spirit of collaboration between the Center's sections, as well as with the greater international research community. The resulting synergy has led to groundbreaking and innovative research.

– Juleen R. Zierath,
Executive Director.



NFF funding
Established
Host institution
Executive Director
Scientific directors

DKK 885 million (€119 million)
2010
University of Copenhagen
Juleen R. Zierath
Juleen R. Zierath, Thue W. Schwartz,
Jens Juul Holst, Gerald Shulman, Torben
Hansen (acting scientific director)
Fields of research
Metabolic genetics, metabolic
receptology, translational metabolic
physiology, integrative physiology,
metabolic imaging and liver metabolism

179 Total		108 Women	71 Men
27 Recruited abroad			
12 Professors	13 Associate professors	44 PhD students	20 Admin staff
6 Assistant professors	36 Postdocs	34 Technical staff	14 Other

NOVO NORDISK FOUNDATION
CENTER FOR
BIOSUSTAINABILITY

A biobased perspective on the world

Why not use the smallest factories to make the biggest possible amounts of high-value chemicals and pharmaceuticals – biosustainably?

The Novo Nordisk Foundation Center for Biosustainability is doing exactly this: developing new technologies for engineering microbes, turning them into cell factories, which are designed for efficient production of a specific compound in a commercially competitive way.

Today, many pharmaceuticals and chemicals are produced from oil or rare plant material. By using genome-scale modelling, advanced robotics and bioengineering, the Center's researchers design and construct cell factories capable of converting low-value carbon sources to high-value chemical compounds and proteins in a more sustainable, cost-effective manner than today. In short: by using cell factories, we can go from an oil-based chemical industry to a highly sustainable bio based industry.

The Center collaborates with the world's leading researchers within the field and has established strategic alliances with universities in the United States, Sweden, South Korea and Denmark.

Innovation is a high priority at the Center. Therefore, it collaborates with biotechnology companies and the chemical industry to enhance knowledge sharing and the application of the Center's results.

“ Humanity needs to find ways of living more sustainably to slow the depletion of natural resources. Using cell factories is a fundamental aspect of this process.

– Bernhard Palsson,
Professor, CEO.

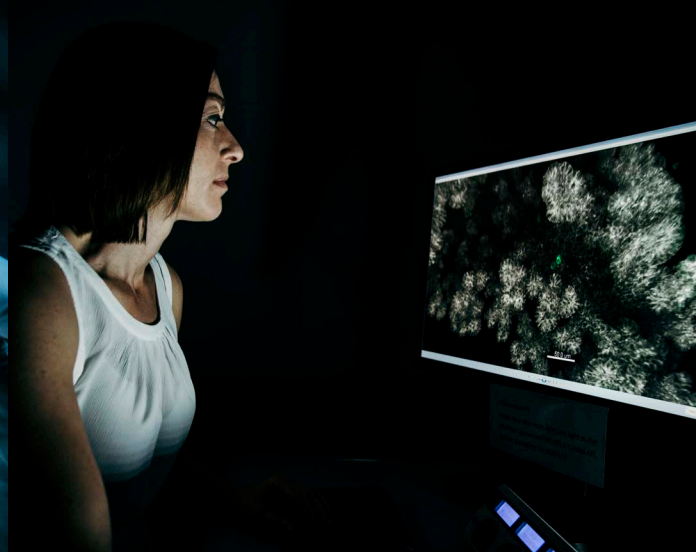
NNF funding DKK 1.3 billion (€174 million)
Established 2011
Host institution Technical University of Denmark
CEO Bernhard Palsson
Scientific directors Bernhard Palsson, Jens Nielsen, Jay Keasling, Mathias Uhlén, Sang Yup Lee, Morten Sommer, Gyun Min Lee, Lars Nielsen
Fields of research Cell factory design, metabolic engineering, genome scale modelling, synthetic biology, biochemicals, therapeutic proteins, advanced robotics

275 Total		107 Women	168 Men
167 Recruited abroad			
17 Professors	23 Associate professors	62 PhD students	21 Admin staff
13 Assistant professors	97 Postdocs	33 Technical staff	9 Other



NOVO NORDISK FOUNDATION
CENTER FOR
STEM CELL BIOLOGY, DANSTEM

Taming stem cells



The Novo Nordisk Foundation Center for Stem Cell Biology, DanStem conducts basic and translational research within developmental, stem cell and molecular biology. Research topics include how to induce stem cells to differentiate into certain types of cells and the specific role of cancer stem cells in developing different types of cancer.

Because many serious diseases result from conditions in which cells are absent or malfunctioning, considerable therapeutic potential can be harvested if researchers can understand and mimic the development from stem cells into specialized cells. The ambition is to generate knowledge that will form the basis for developing more targeted and efficient therapies for diabetes, neurodegenerative diseases and cancer.

In 2017, the Center strengthened its focus on translational research by establishing a Programme for Translational Hematology. With the Programme, the Center aims to establish a platform for testing new drugs and identifying potential new targets for developing new therapies for patients with blood cancer.

The Center comprises eleven internationally renowned research groups, including seven recruited from Sweden, Switzerland, Scotland, England and the United States. All groups have established global networks and participate in international research projects.

“ We aim to make important discoveries in basic and translational stem cell research. The Center is also active in educating the next generation of stem cell scientists working both in basic and clinical research, whom we hope will challenge the current scientific dogmas and become the future leaders within the field.

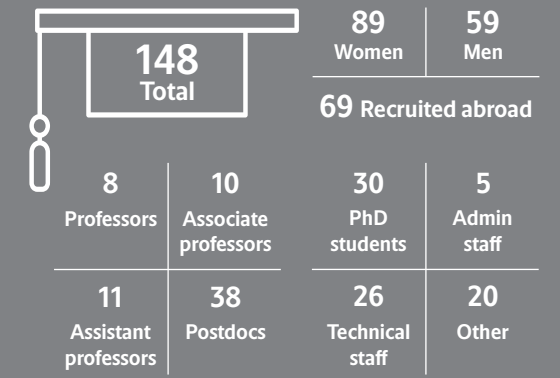
– Henrik Semb, Professor, Executive Director.

NNF funding
Established
Host institution
Executive Director
Group leaders

DKK 685 million (€92.1 million)
2011
University of Copenhagen
Henrik Semb
Henrik Semb, Joshua Brickman, Elisabetta Ferretti, Anne Grapin-Botton, Kristian Helin, Agnete Kirkeby, Elke Ober, Ole William Petersen, Bo Porse, Jakub Sedzinski, Palle Serup

Fields of research

Pancreas and beta cell development, endodermal organogenesis and regeneration, pluripotent stem cell biology, pancreatic cancer, cancer stem cell biology, developmental biology.



Taking protein research to the next level

Protein-related technologies can potentially be even more revolutionary than genomic approaches for understanding the complex wiring of biological systems and disease processes. However, concerted efforts are required to realize this potential. The Novo Nordisk Foundation Center for Protein Research aims to assemble all of the required technologies under one roof.

The vision of the Center is to be the world's leading centre in integrative protein technologies and their application to accelerate understanding of the biological processes underlying health and disease.

At the Center, this has been achieved by establishing four integrated protein technology platforms as well as advanced management systems for large heterogeneous data to advance the understanding of complex protein networks in fundamental biology and disease; continuing to educate the next generation of top-tier protein scientists; and becoming an unmatched global partner in protein research.

The Center focuses on four major and complementary research programmes: proteomics, disease systems biology, protein structure and function and protein signalling, each of which is supported by state-of-the-art protein technology platforms (mass spectrometry, protein production and characterization, protein imaging and big data management).

Assembling this knowledge and technology under one roof gives the Center the advantage of creating vital synergy effects and cross-disciplinary collaboration across research groups and programmes.

In addition, researchers at the Center collaborate with numerous partners in Denmark and with some of the most prominent research institutions worldwide both in the public and private sector.

“ The Center has huge potential and provides fantastic opportunities for protein researchers at all levels of career development.

– Jiri Lukas, Professor,
Executive Director.

NNF funding DKK 780 million (€104.7 million)
Established 2007
Host institution University of Copenhagen
Executive Director Jiri Lukas
Programme directors Jiri Lukas, Søren Brunak, Matthias Mann, Guillermo Montoya
Fields of research Disease systems biology, proteomics, protein structure and function, protein signalling

162 Total		80 Women	82 Men
65 Recruited abroad			
11 Professors	10 Associate professors	41 PhD students	13 Admin staff
3 Assistant professors	36 Postdocs	35 Technical staff	13 Other

Investing in top technologies

The research infrastructure of the Copenhagen Bioscience Cluster concentrates top-quality technologies, services and skills under effective management, with easy access for the scientific community.

The infrastructure plays an important part in meeting the challenges posed by increasingly complex research requirements, including the need for costly equipment, dedicated expertise and extensive data collection, storage and processing.

The infrastructure includes the Danish National Biobank, which is one of the world's largest biobanks and provides an overview of and access to millions of biological samples in Denmark's healthcare system. The samples can be linked with information from Denmark's unique nationwide registries, which contain detailed information about all residents. For example, a researcher can find blood samples from people with cancer – taken before they developed the disease – and can use the samples to study markers for the later development of the disease.

Another part of the infrastructure is an advanced cryoelectron microscope established at the University of Copenhagen in early 2017. The microscope gives researchers new opportunities to study the structure of proteins in detail, thereby enabling them to better understand and map their function and interaction with other proteins and molecules, including drugs.



Attracting talent

Focusing on the entire research chain, the Copenhagen Bioscience Cluster aims to attract the best researchers at all career stages while providing researcher education of international quality.

Currently, the Cluster employs about 800 people, including more than 300 researchers recruited from abroad.

In 2016, the Novo Nordisk Foundation initiated the Copenhagen Bioscience PhD Programme, a fully funded 4-year PhD programme that offers talented international students the opportunity to come to Denmark to complete a PhD programme at a centre in the Cluster. The Programme accepts 16 students annually. The Programme aims to educate the next generation of top researchers and to promote interdisciplinarity.

Join the Programme

The Programme is open for applications in October–December 2017.





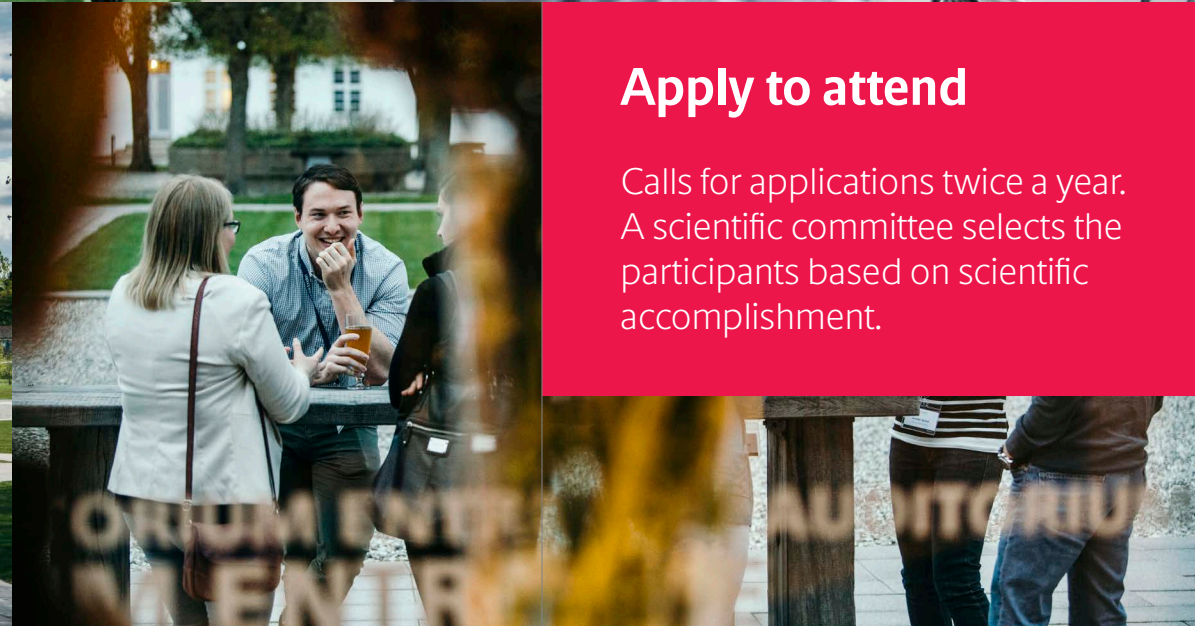
Room for scientific debate

The Copenhagen Bioscience Conferences are scientific conferences that convene top researchers and talented young people from around the world to discuss the latest scientific results and opportunities for collaboration.

Lasting 4 days, the Conferences feature some of the world's leading researchers as speakers. The Conferences are open to researchers at all stages of their careers.

To promote a relaxed, trusting and open atmosphere, the number of participants at each conference is limited to 150–250. In addition to lecture hall talks, the Conferences comprise several alternative session formats, including a PI Pub and the Editors' Corner to enhance networking and knowledge-sharing.

The Novo Nordisk Foundation pays for all accommodation, transport and meals during the Conferences.



Apply to attend

Calls for applications twice a year. A scientific committee selects the participants based on scientific accomplishment.

Cluster voices

“ The establishment of the four life science-based research centres has attracted researchers at all stages of career development and from all over the world to come to Copenhagen to practice world-class science. Here I can actually pursue my life-long career goals.

Bernhard Palsson
CEO and Professor
Novo Nordisk Foundation Center for
Biosustainability



“ The Center aims to understand key biological mechanisms using cutting-edge technologies. We have therefore invested significantly in state-of-the-art infrastructure. This is essential to sustain our competitiveness at the world-class level.

Guillermo Montoya
Research Director and Professor
Novo Nordisk Foundation Center for
Protein Research



“ The scientific environment is very supportive. We are like a family and use each other to improve our research. We are encouraged to look outside the box and pursue our own research ideas. As a young researcher, I believe this is definitely the right place to be.

Theresia Schnurr
PhD student
Novo Nordisk Foundation Center for
Basic Metabolic Research



“ Our groups are collaborating, they are also publishing together, and every day when I walk through the corridors I have this fantastic sense of synergy. I want to create a new norm and prove that trust and collaboration is the way to go to achieve great results in science.

Henrik Semb
Executive Director and Professor
Novo Nordisk Foundation Center for
Stem Cell Biology, DanStem



Looking to the future

The Novo Nordisk Foundation continually strives to strengthen and expand the Copenhagen Bioscience Cluster. In the coming years, the Foundation will continue to award grants to benefit the Cluster and further improve the level of research, thereby strengthening the position of Greater Copenhagen as an international hub for research within the biosciences.

Overall, the aim of the Cluster is to contribute to solving global challenges such as diseases associated with lifestyle and the depletion of natural resources.





The Novo Nordisk Foundation

The Novo Nordisk Foundation is an independent Danish foundation with corporate interests. Its history goes back more than 90 years.

The objectives of the Foundation are:

- to provide a stable basis for the commercial and research activities of the companies in the Novo Group; and
- to support scientific, humanitarian and social purposes.

The vision of the Foundation is to contribute significantly to research and development that improves the health and welfare of people. Since 2010, the Foundation has donated more than DKK 13 billion (€1.7 billion), primarily for research within biomedicine and biotechnology and diabetes treatment at universities and hospitals in Denmark and the other Nordic countries.

The Foundation's grants include the Novo Nordisk Foundation Challenge Grants of up to DKK 60 million over 6 years and the Novo Nordisk Foundation Laureate Research Grants of up to DKK 40 million over 7 years. The recipients of these grants are naturally associated with the Copenhagen Bioscience Cluster and invited to participate in the Cluster activities.

Read more: www.novonordiskfoundation.com



Copenhagen Bioscience Cluster

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a novo nordisk foundation initiative