

# Report on research collaborations and investments in Sweden

# Impact

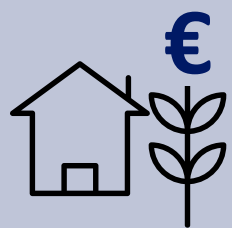


# Executive summary

## Novo Holdings



Between 2018 and 2022, Novo Holdings have invested in 11 companies based in Sweden.



In 2022, the Novo Holdings portfolio included 4 Swedish companies with approximately 220 employees

## Novo Nordisk Foundation



Between 2018 and 2022, the Novo Nordisk Foundation (NNF) financed 256 projects with Swedish main applicants, totaling EUR 110 million.



Between 2018 and 2022, NNF financed 17 projects with Swedish co-applicants collaborating with Danish main applicants, totaling EUR 20 million.



In 2022, NNF funded 9 senior researchers and 157 young researchers, PhDs and Postdocs, in projects involving Swedish main applicants.

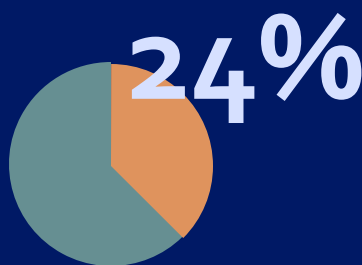
## Grant recipients

131

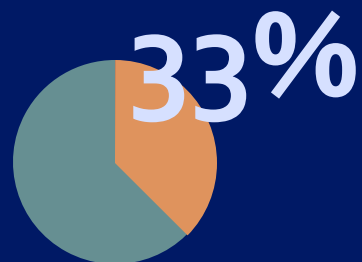
Between 2018 and 2022, Swedish NNF grant recipients collaborated with 131 international companies. 51 are in the biotechnology sector, and 54 have less than 50 employees.

40

Between 2018 and 2022, Danish NNF grant recipients collaborated with 40 Swedish companies. 17 are in the biotechnology sector, and 22 have less than 50 employees.



Between 2018 and 2022, Swedish NNF grant recipients have co-authored 1294 publications with international researchers. 24% of the publications are among the top 10% most cited in their field.



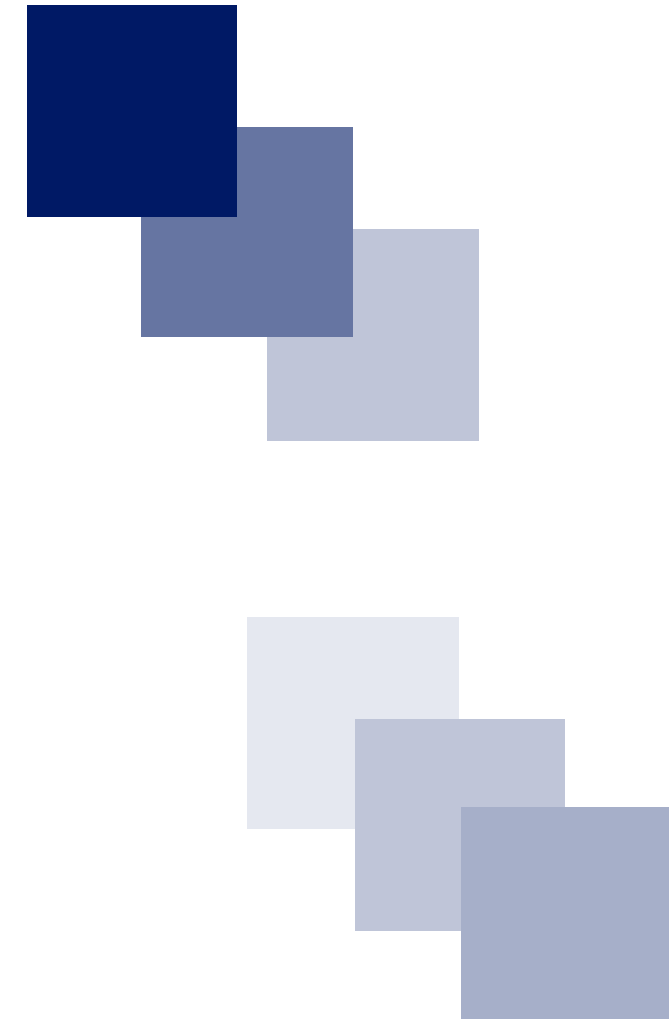
Between 2018 and 2022, Danish NNF grant recipients have co-authored 1453 publications with Swedish researchers. 33% of the publications are among the top 10% most cited in their field.

# Introduction

This report showcases NNF's contribution to the Swedish academic community and industry. In two sections the report present;

- The Novo Nordisk Foundation (NNF) grant recipient collaborations;
  - Swedish NNF grant recipients' collaboration with international partners
  - Danish grant recipients' collaboration with Swedish partners
- An overview of Novo Holdings' investments in Sweden.

Through figures and case studies, the report demonstrates the different kinds of relationships and activities between NNF grant recipients and Swedish and international partners. Data in the report are based on activities between 2018 and 2022 (inclusive).



# Novo Nordisk Foundation





# The history of the Novo Nordisk Foundation



The Novo Nordisk Foundation dates back to 1922, when Nobel laureate August Krogh returned home from the United States and Canada with permission to produce insulin in the Nordic countries. This marked the beginning of the development of world-class diabetes medicine in Denmark and the establishment of several foundations that, many years later, merged into today's Novo Nordisk Foundation.

1952 – the **Novo Foundation** was established as the owner of the Novo Terapeutisk Laboratorium.

**1989** – the Novo Foundation and the Nordisk Insulin Foundation were merged into **Novo Nordisk Foundation** as part of the merger between the two firms Novo Terapeutisk Laboratorium and Nordisk Insulinlaboratorium in Novo Nordisk A/S.

In 2022 the **Novo Nordisk Foundation** awarded 695 grants with a total amount of EUR 1.0 billion.

For more information, please see the [Impact Report 2022](#)

1922 – the **Nordisk Insulin Foundation** was established as the owner of the Nordisk Insulinlaboratorium. The founders agreed that the profit from the sale of diabetes medicine should be used for scientific and humanitarian purposes.

# The Novo Nordisk Foundation is an independent Danish enterprise foundation



# Facts about the Novo Nordisk Foundation

3

The world's  
third largest  
measured in grants

1

The world's  
largest  
measured in assets:  
EUR **84** billion

## 2022 in numbers

Awarded DKK  
**7.5** billion  
EUR 1.0 billion

Paid out DKK  
**5.2** billion  
EUR 693 million

**695**  
Grants awarded

**3,070**  
Applications  
received

**18%**  
Success rate for  
research applications  
in open calls

Investment result 2022  
**3.1** DKK billion  
EUR 413 million

# Our vision to improve people’s health and the sustainability of society and the planet is pursued through a three-pronged mission

Improving the lives of people by progress research and innovation in prevention and treatment of cardiometabolic and infectious diseases



Theme 1: Preventing cardiometabolic disease



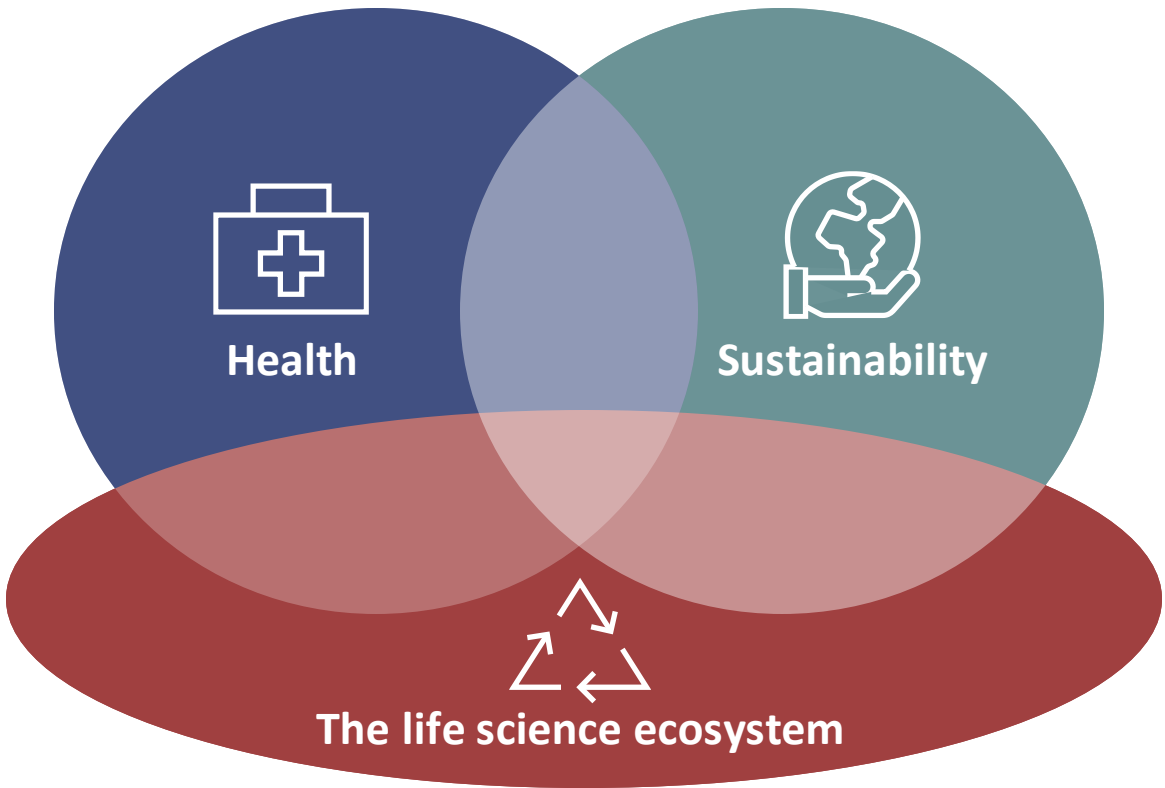
Theme 2: Understanding and managing cardiometabolic disease



Theme 3: Fighting inequity in health



Theme 4: Strengthening epidemic preparedness



Improving the sustainability of society by advance knowledge and solutions to support the green transition in society



Theme 1: Sustainable and high-yield agriculture



Theme 2: Sustainable food for healthy diets



Theme 3: High-impact climate change mitigation technologies



Theme 4: Supporting society in the green transition

Invest in scientific research, education and innovation to enable a world class life science ecosystem



Theme 1: Fundamental research



Theme 2: Enabling research infrastructures and technologies



Theme 3: Translational capacity and societal impact



Theme 4: Education and science capital



# NNF grant recipient collaborations

This section is presented in two parts;

- Activities that Swedish NNF grant recipients have with international institutions and organisations.
- Activities that Danish NNF grant recipients have with institutions and organisations in Sweden.





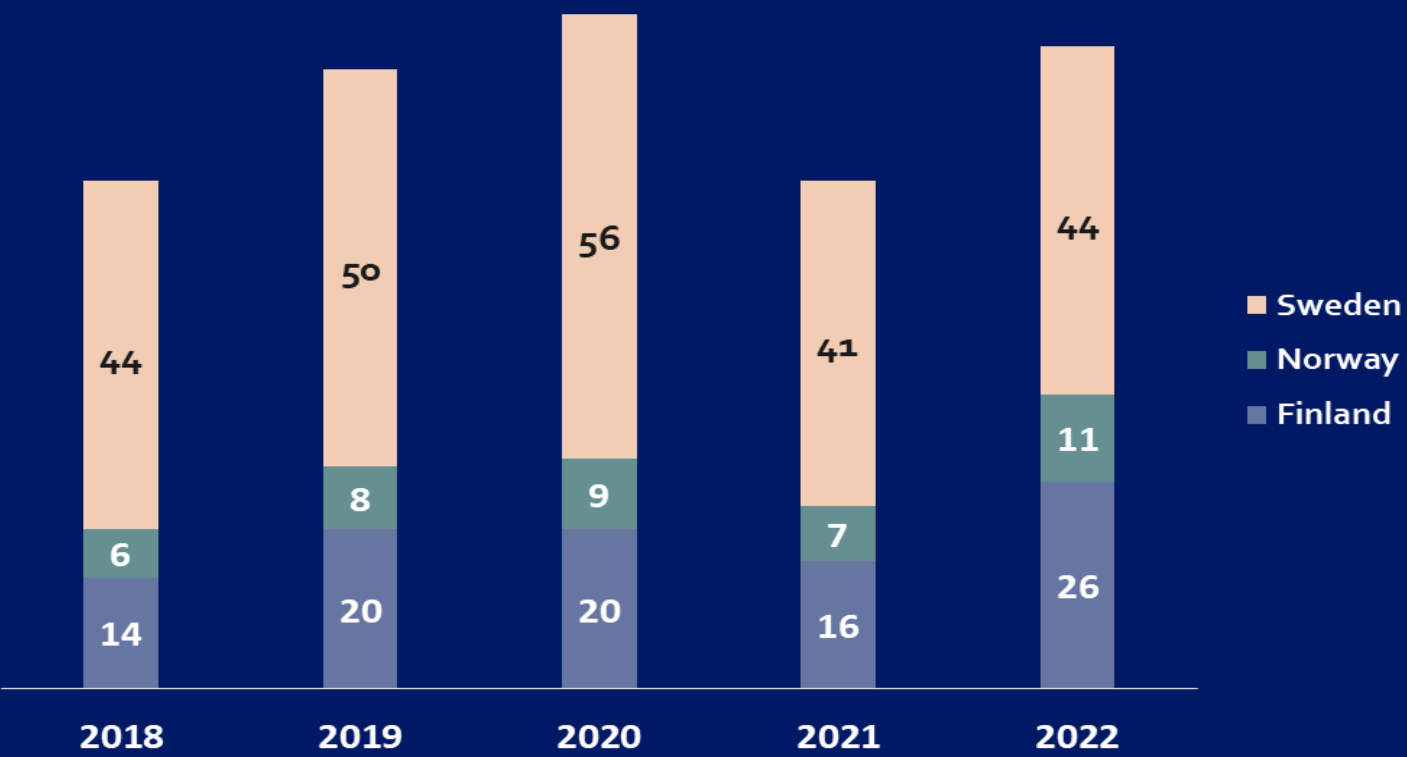
International academic  
and industry  
collaborations involving  
Swedish NNF grant  
recipients 2018-2022



# Centre of gravity

The centre of gravity for NNF is Denmark, followed by the Nordic countries of Finland, Sweden, and Norway. The Foundation awards grants to both Danish and Nordic researchers and to collaborations between researchers in the Nordic countries.

Between 2018 and 2022, the foundation has awarded **372** grants to main applicants in Sweden, Norway and Finland, **8** of these being collaborative projects with Danish partners.

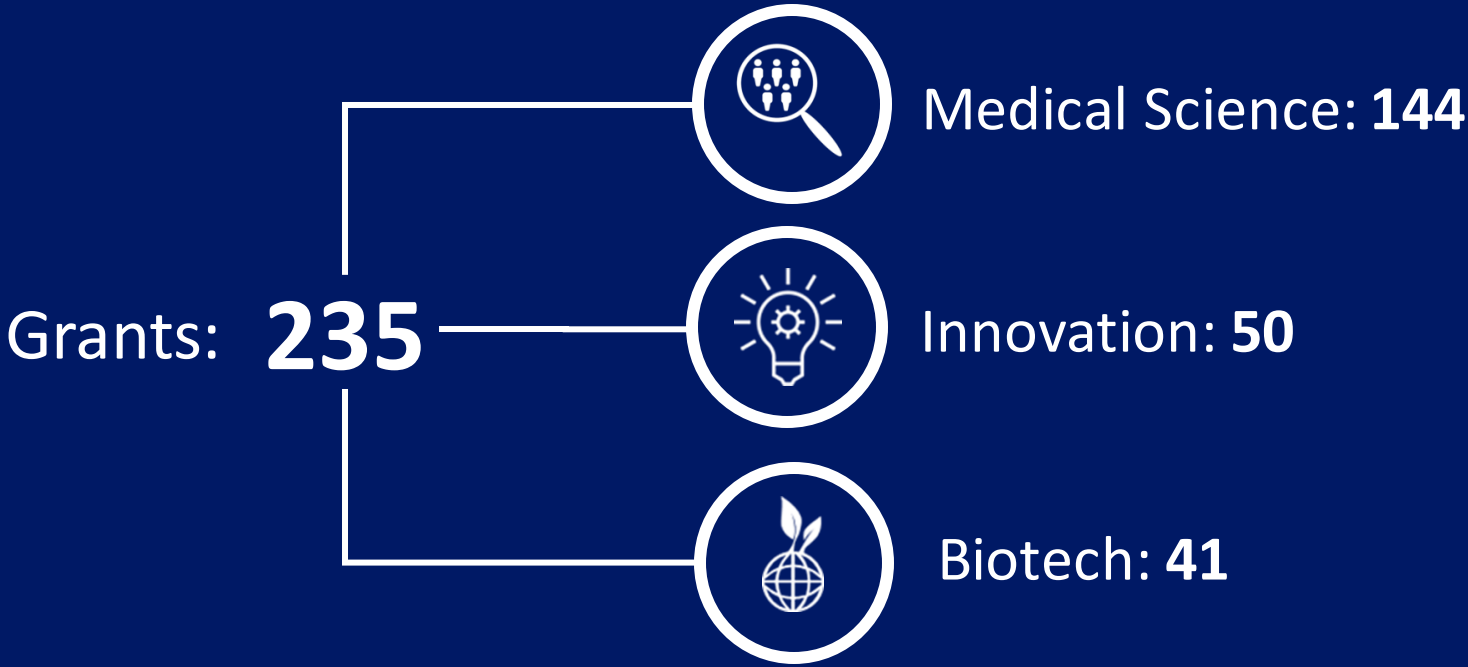




# 235 projects funded by NNF include Swedish researchers as main applicants

The Novo Nordisk Foundation has in the last five years (2018-2022) funded 235 project with main applicants from Sweden. The total funding allocated to these projects is EUR 85 million.

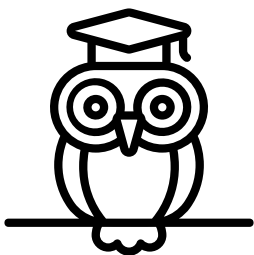
The funded projects span programme areas including Biomedicine, Biotechnology and Innovation. 210 projects were awarded in open competition, while 25 were awarded as standalone grants.



- **Swedish University of Agricultural Sciences** and **University of Copenhagen** have received funding for the project: Gene edited potatoes for reduced pesticide usage. The EUR 0.5 million grant has a duration of three years.
- **Lund University** and **Technical University of Denmark** have received funding for the project: Thermophilic aerobes as novel biorefinery organisms. The EUR 0.4 million grant has a duration of 5 years.



# Institutional affiliation of Swedish main applicants awarded a NNF grant



The **235** grants amounting to EUR **85** million are distributed between **15** different institutions in Sweden, comprising universities, university hospitals and a university incubator.

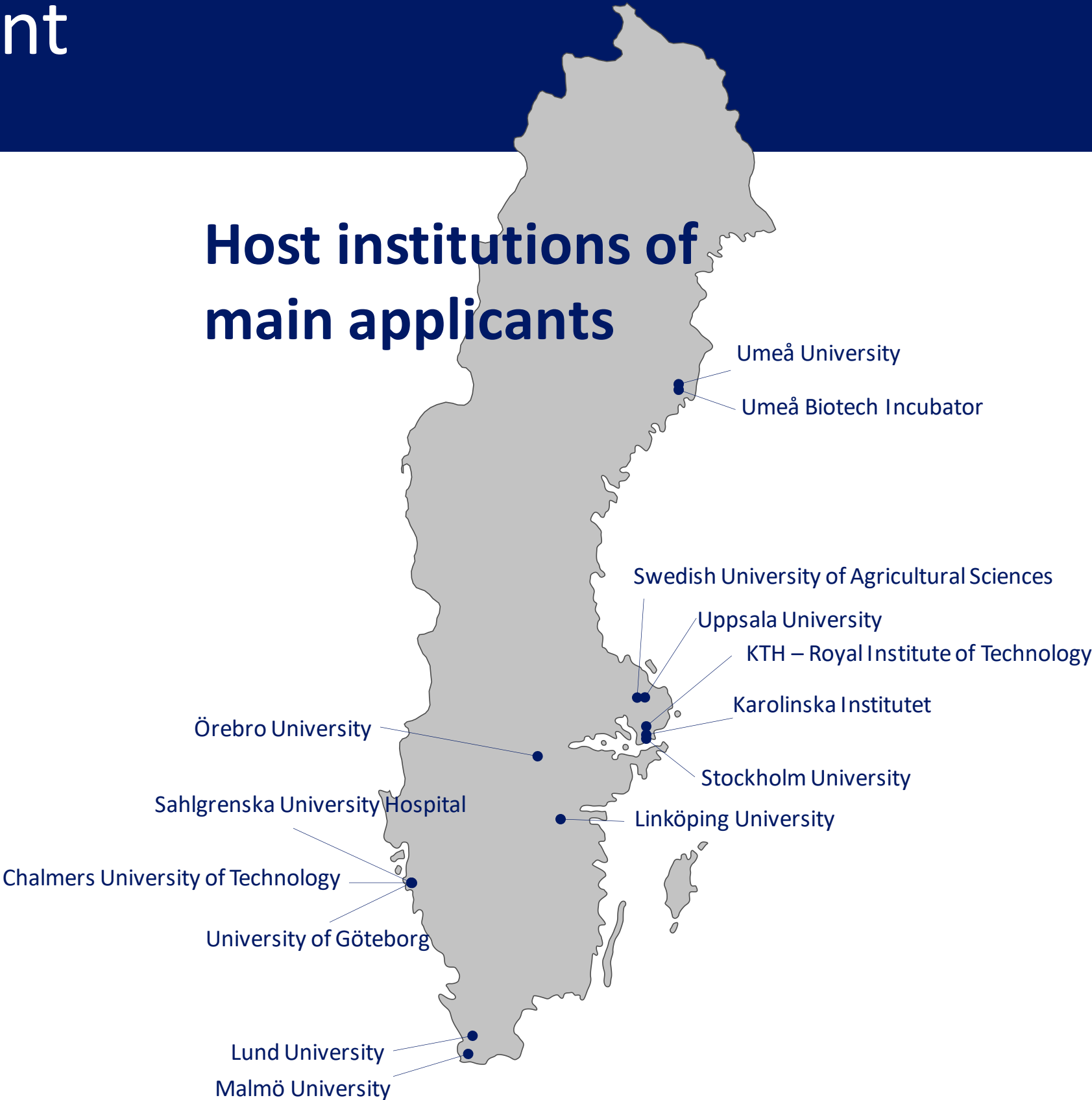


Karolinska Institute has received EUR **31** million in funding for a total of **79** projects.



Lund University has received EUR **14** million for **46** projects.

## Host institutions of main applicants



# Fostering the development of research talent at all levels

In 2022 the Novo Nordisk Foundation supported 9 researchers, 63 PhDs, 94 Postdocs and 166 other staff at Sweden based research institutions through projects awarded to Swedish main applicants.

**The Copenhagen Bioscience Conferences** are a series of scientific conferences within biomedicine and biotechnology. They bring together some of the world's top researchers and young talent to discuss the latest scientific results and topics within their field. The purpose of the conferences is to enable participants to build an international network and to exchange knowledge and ideas.



Since 2014, **149** young Swedish researchers have been awarded a grant to attend the Copenhagen Bioscience Conferences for young research talent.

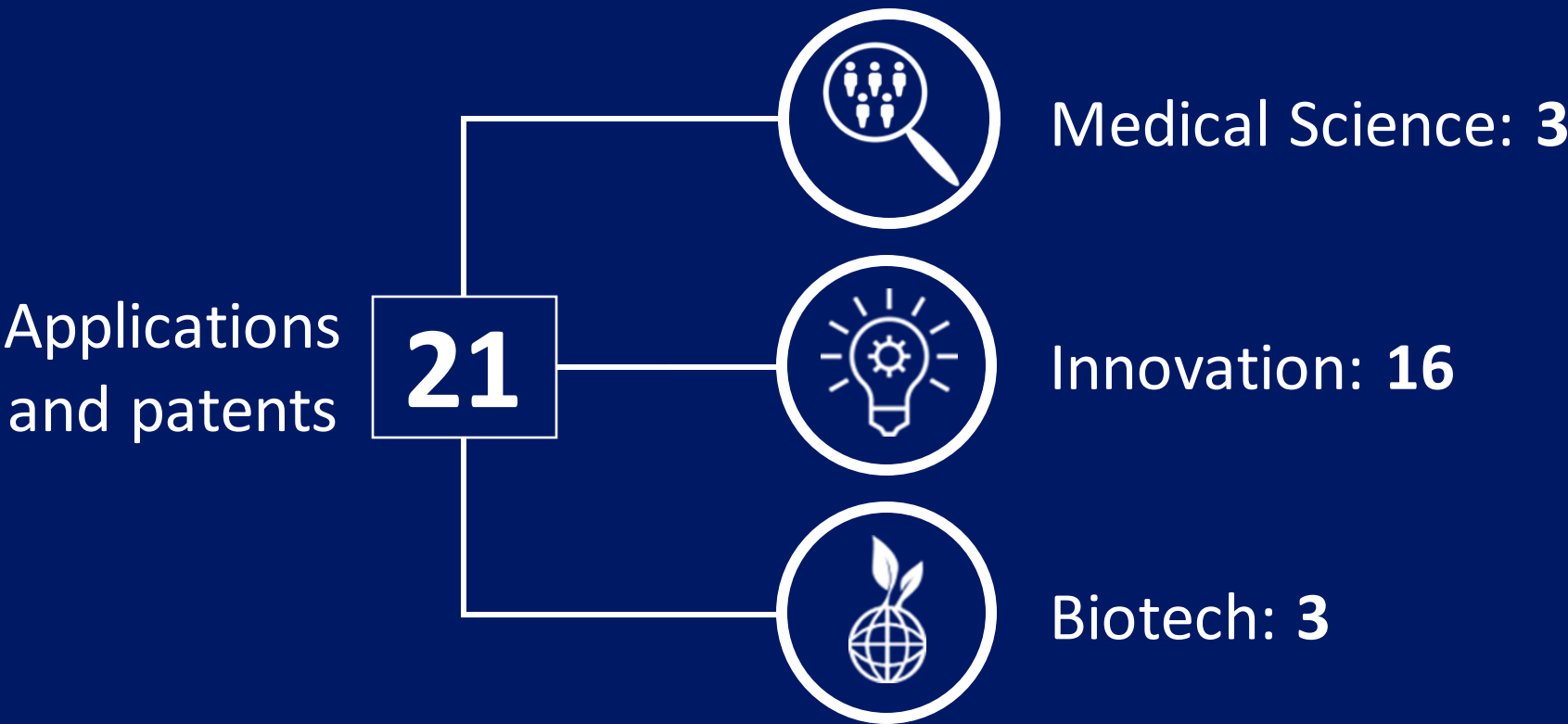
*“An opportunity that facilitate high level training for PhD students and postdocs”*

*NNF applicant, 2015*



# Patents from projects with Swedish main applicants

The Foundation’s projects with Swedish main applicants have in the last five years (2018-2022) produced a total of 21 patents and patent applications, 2 of these are granted patents. The patents and applications span programme areas including Biotechnology, Innovation and Medical Science.

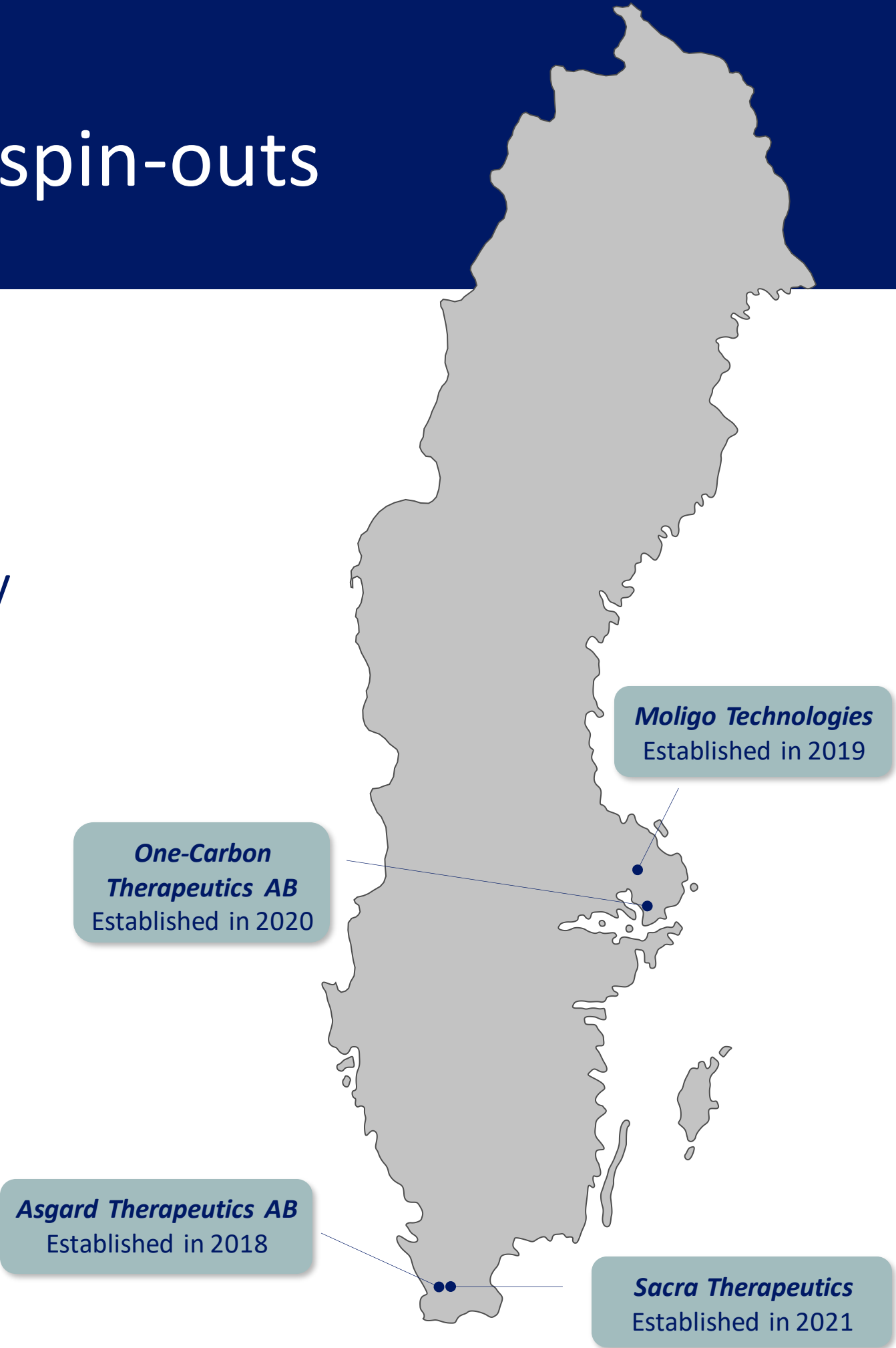


In 2020, **Lund University** researchers were granted a patent for a medical device for cardiac surgery. The patent is attributed to a project that received funding from NNF in 2018.



# Swedish NNF grants lead to university spin-outs

Between 2018 and 2022, NNF’s Explorative Pre-seed grants received by Swedish main applicants has resulted in 4 spin-out companies: 2 situated in Stockholm, spun out from Karolinska Institute and Stockholm University; and 2 companies formed by researchers affiliated with Lund University.





# Swedish NNF grant recipients collaborate with many international partners

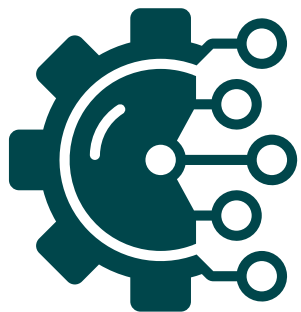
## Between 2018 and 2022...



The Foundation's Swedish grant recipients have many collaborations with national and international project partners. In total, **1342** partners contribute to the collaborations.



Of these, **914** are universities, university hospitals or hospitals. In total, **77** different countries are represented.

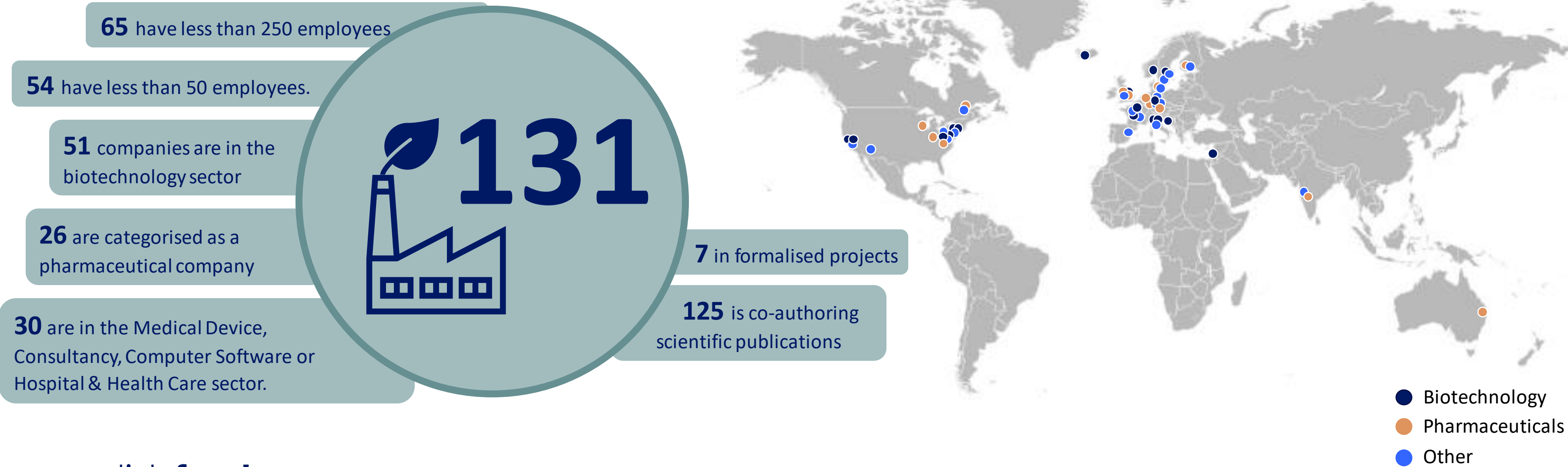


**269** of the international partners are US based.

Of these, **46** are companies that have co-authored at least one scientific article with a Swedish grant recipient from the Novo Nordisk Foundation.

# Swedish NNF grant recipients collaborate with many national and international companies

In total 131 national and international companies collaborate with Swedish NNF grant recipients





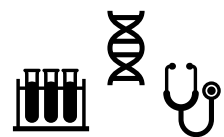
# Swedish NNF grant recipients collaborate internationally



Between 2018 and 2022, Swedish grant recipients have published **1294** publications in internationally recognized journals.



**73%** of the publications are co-authored with researchers affiliated with an organization outside Sweden. The national average among the top Swedish universities is 68%.



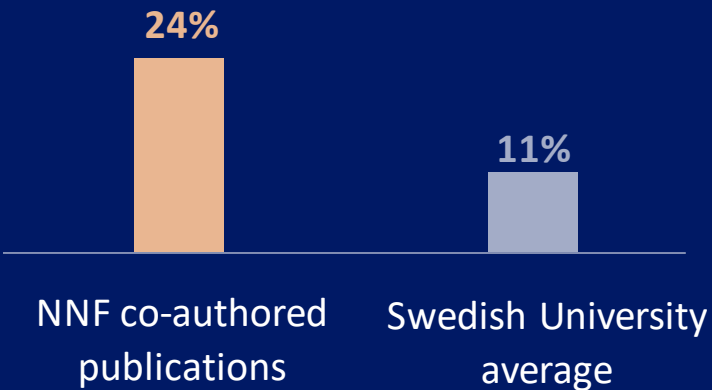
The most frequent international partner is Harvard University with 86 publications, followed by University of Helsinki with 84 publications, and University of Oxford with 70 publications.



**24%** of the publications are within the top 10% most cited publication in their research field. The national average among the top Swedish universities is 11%.

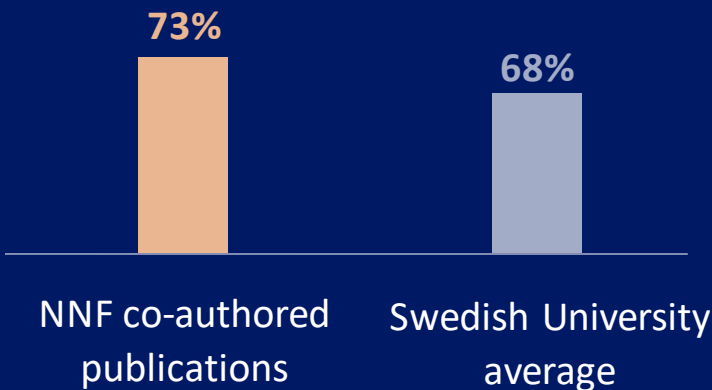
# NNF grants contribute to research excellence

Share of publications among the top 10% most cited world-wide in the same research field and year



# Swedish grant recipients publish frequently with international peers

Share of publications co-authored by Swedish researchers and researchers affiliated with an institution located outside Sweden

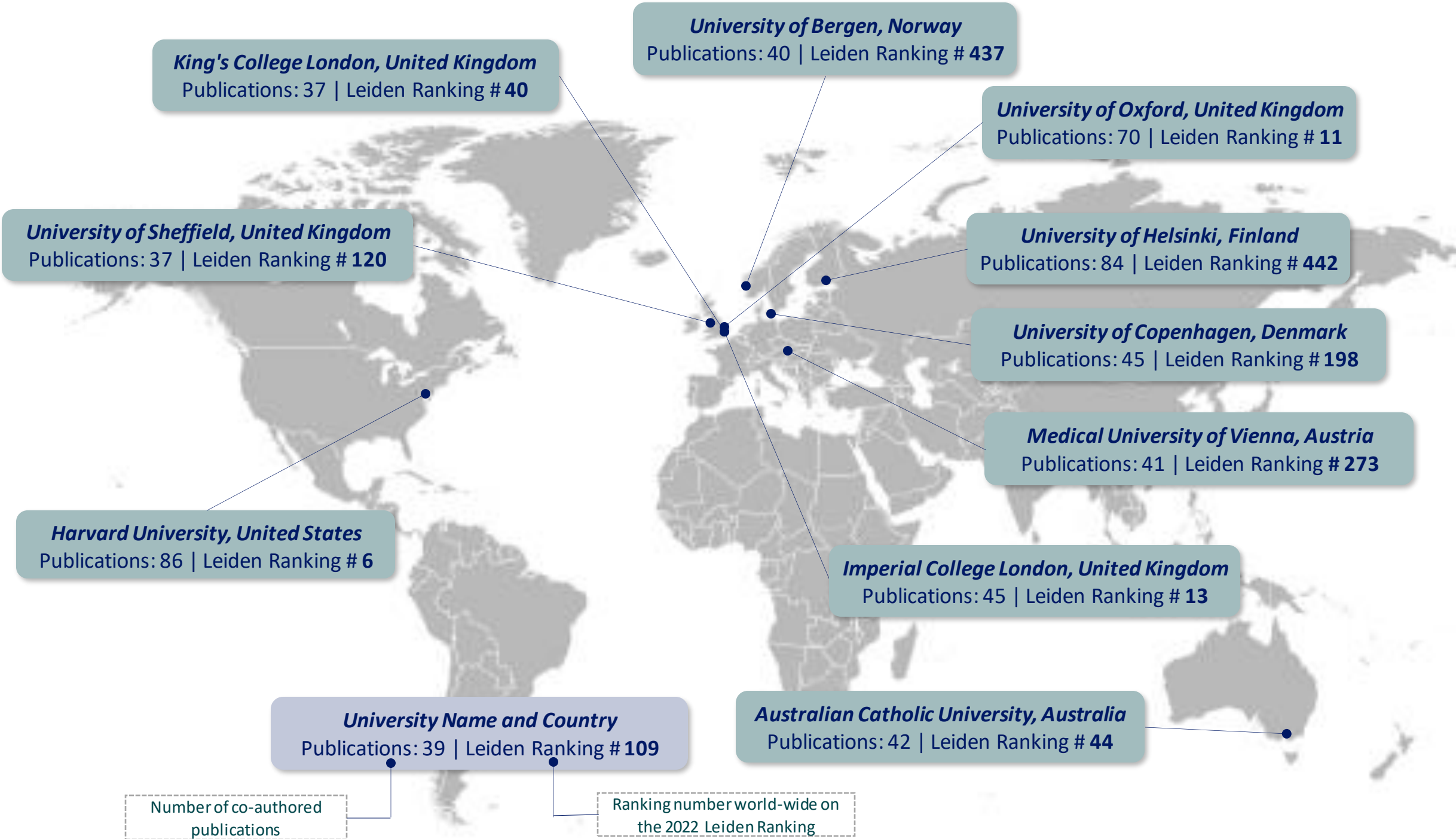


# Swedish NNF grant recipients’ collaboration with top international universities

Top 10 universities collaborating with NNF’s Swedish grant recipients ranked by number of publication collaborations

1	Harvard University, United States
2	University of Helsinki, Finland
3	University of Oxford, United Kingdom
4	University of Copenhagen, Denmark
5	Imperial College London, United Kingdom
6	Australian Catholic University, Australia
7	Medical University of Vienna, Austria
8	University of Bergen, Norway
9	King's College London, United Kingdom
10	The University of Sheffield, United Kingdom

Source: Novo Nordisk Foundation, CWTS Leiden Ranking 2021





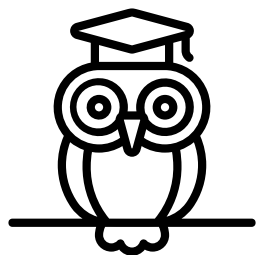


Swedish academic and industry collaborations involving Danish NNF grant recipients 2018-2022

# Between 2018 and 2022, NNF has funded **17** projects involving Danish researchers collaborating with Swedish peers



The Novo Nordisk Foundation has awarded a total of EUR **20** million to **17** projects with Swedish co-applicants collaborating with Danish main applicants.



**9** universities and university hospitals have been awarded a grant between 2018 and 2022.



Lund University is co-applicant for a grant with Aalborg University. The EUR **6** million grant has a duration of six years.

## Swedish co-applicants





# Danish NNF Grant recipients' collaborations with Swedish partners

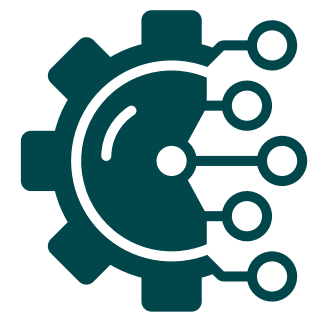
Between 2018 & 2022...



The Foundation's grant recipients have collaborated with many international project's partners, including **144** collaborations between Danish and Swedish partners.



**44** of those partners are universities and university hospitals.



**37** Swedish companies co-authored at least one scientific article with grant recipients from the Novo Nordisk Foundation.

# Case stories

## A University Collaboration



A collaboration between **Lund University** and **University of Copenhagen** has led to the discovery of how various natural compounds can trigger cell death (autophagy) in plant cells. More importantly, the project has uncovered how cell death is an important mechanism through which plant cells adapt to changes in their environment. The collaboration is now looking into how exactly the identified compounds affect plant cells' ability to adapt to environmental changes.

## A Hospital Collaboration



A collaboration between **Karolinska University Hospital** and **Copenhagen University Hospital** is looking at the safety of using nasally administered ketamine and sufentanil for the treatment of pain in children. The collaboration has provided access to a registry containing clinical data corresponding to approximately 3,000 treatments. This allows for a systematic review of a large cohort of children spanning 10 years of treatment and will provide invaluable information for future treatments of pain in children.

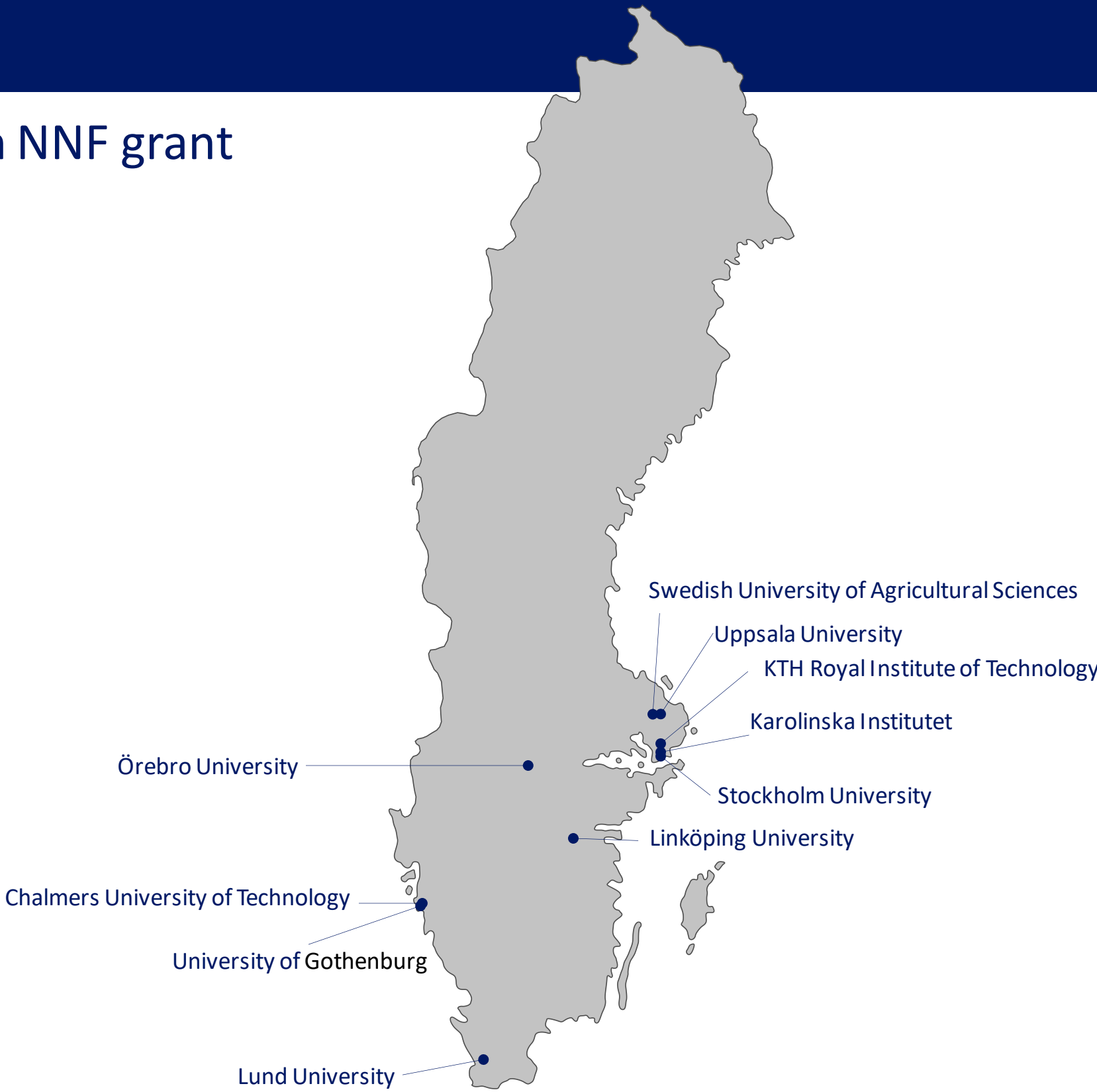


# Danish NNF Grant recipients' collaboration with top Swedish universities

10 out of 10 top Swedish universities collaborate with Danish NNF grant recipients

		Project collaborations	Publication collaborations
1	Karolinska Institutet	6	447
2	Stockholm University	2	59
3	Swedish University of Agricultural Sciences	0	23
4	Chalmers University of Technology	0	242
5	University of Gothenburg	2	109
6	Lund University	4	298
7	KTH Royal Institute of Technology	0	55
8	Uppsala University	5	160
9	Linköping University	0	46
10	Örebro University	0	55

Source: Novo Nordisk Foundation, CWTS Leiden Ranking 2022



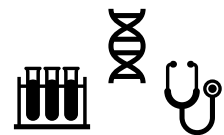
# Publication collaborations between Danish NNF grant recipients and Swedish partners



Between 2018 and 2022, Danish NNF grant recipients have co-authored **1453** publications with researchers located in Sweden.



The highest number of Swedish partners come from Karolinska Institutet (447 publications) followed by Lund University (298 publications) and Chalmers University of Technology (242 publications).



**57.5%** of the co-authored publications are within the research areas *Medicine and Biochemistry, Genetics & Molecular Biology*.

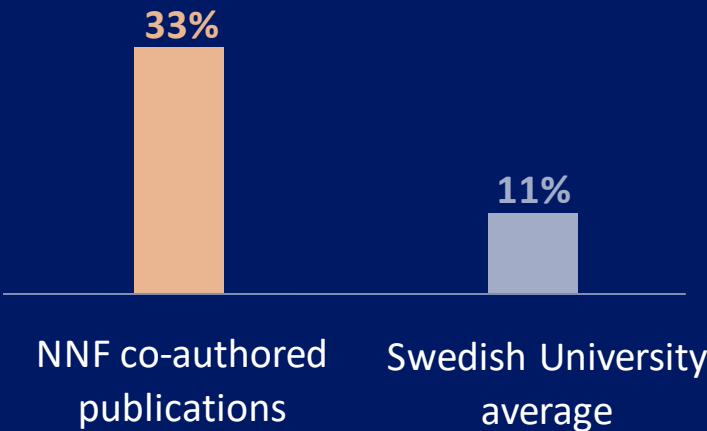


**33%** of the co-authored publications are within the top 10% most cited publication in their research field. The national average among the top Swedish universities is 11%.

Source: Novo Nordisk Foundation (2023) based on The Leiden Ranking

## NNF grants contribute to research excellence

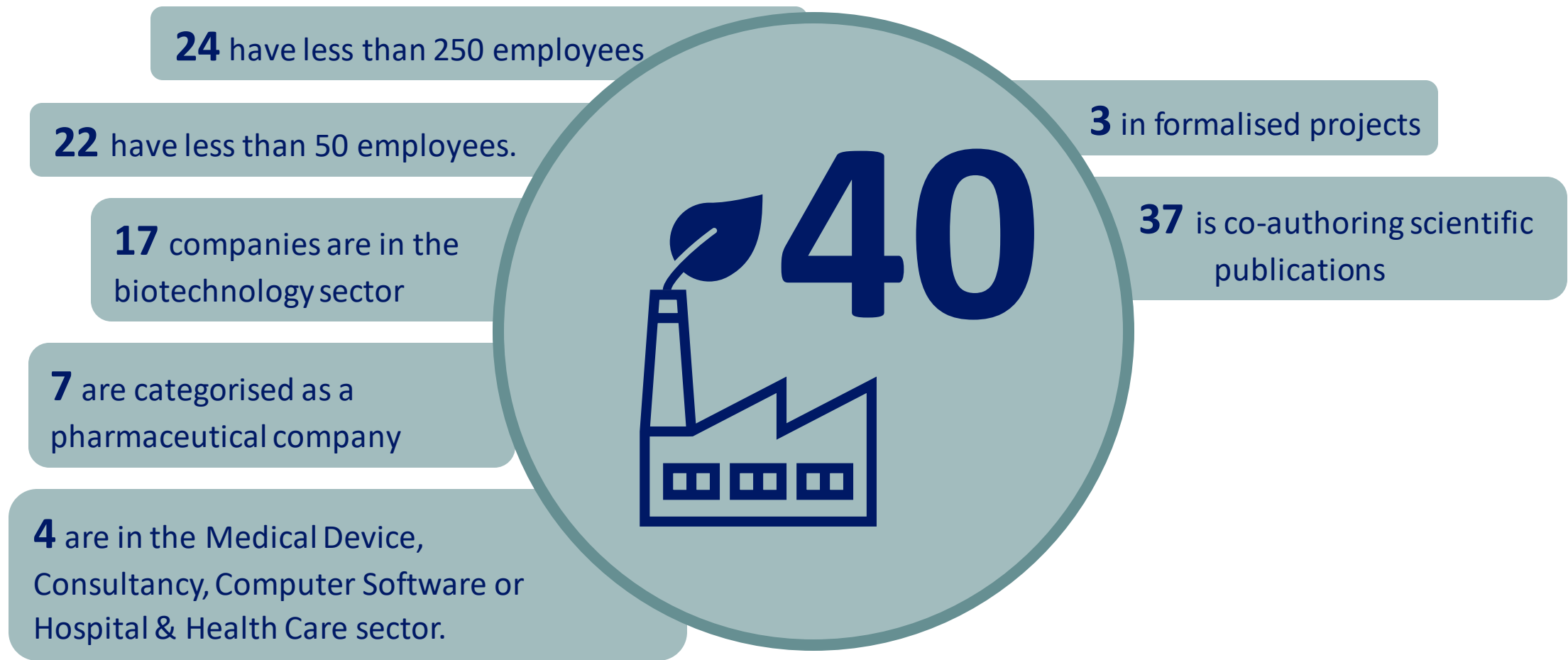
Share of co-authored publications among the top 10% most cited world-wide in the same research field and year





# Danish researchers receiving grants from the Novo Nordisk Foundation collaborate with Swedish companies

**In total 40 Swedish companies collaborate with Danish NNF grant recipients**



# The NNF Dashboard on Grants and Impact

The NNF Dashboard is your gateway to information about the entire value chain of grant development, starting with Calls & Applications, through to awarded grants and their impact. In addition to visualising numbers on awarded grants, gender distribution of grant holder and grant recipients host institutions, the NNF Dashboard provides insights and details on the overall development year-to-year.

For more information, please visit

<https://novonordiskfonden.dk/facts-and-figures/>







# Novo Holdings A/S in Sweden

## Our mission

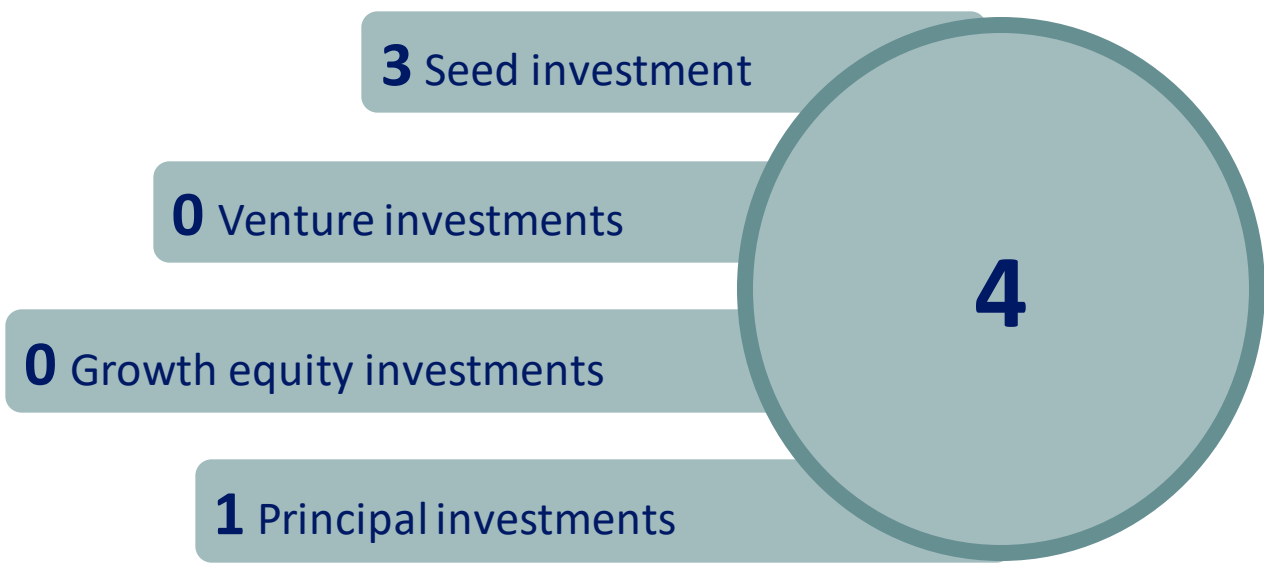
Novo Holdings is to be a supportive owner of the Novo Group companies and to make a growing and positive impact on health, science and society by generating attractive long-term returns on the assets of the Novo Nordisk Foundation.



# Novo Holdings A/S Investments in Sweden

Novo Holdings A/S has in the period 2018-2022 invested in **11 Swedish companies**. In 2022, the portfolio included 4 companies with approximately 220 employees.

## Companies in the current portfolio





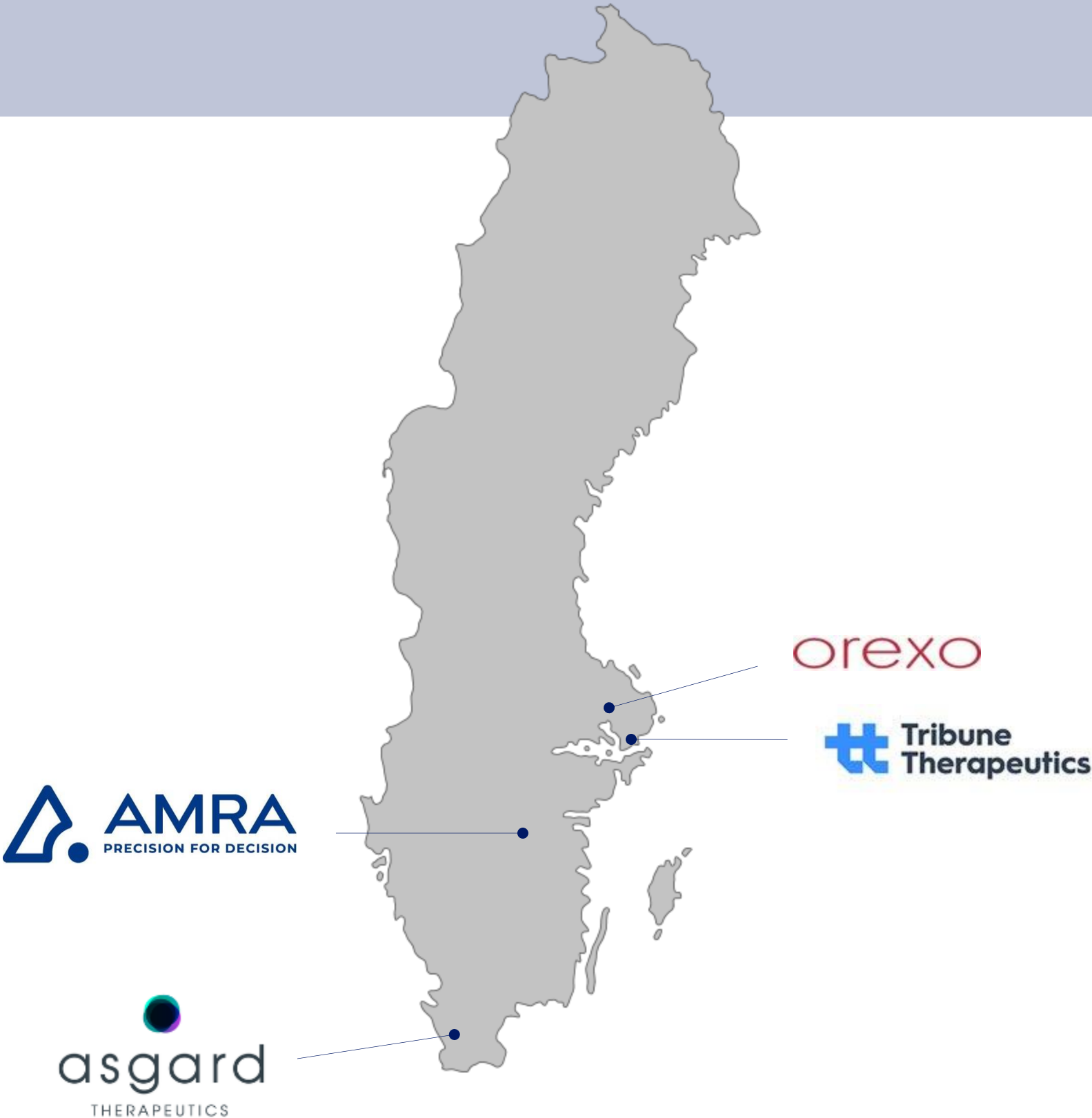
# Novo Holdings A/S Investments in Sweden

**Tribune Therapeutics** is a preclinical biopharmaceutical company building a promising pipeline of novel medicines to treat patients with a wide range of fibrotic diseases. Novo Holdings A/S founded and invested in the company together with HealthCap, one of the largest specialized providers of venture capital within life sciences in Europe.

**Asgard Therapeutics** is a private biotech company pioneering in vivo direct cell reprogramming approaches to elicit potent anti-cancer immune responses. Asgard pioneers a novel approach to cancer therapy by reprogramming tumor cells into professional antigen presenting cells. Novo Holdings A/S co-leads EUR 6M seed Financing in the company.

**Orexo** is a specialty pharmaceutical company focused on the therapeutic areas of opioid addiction treatment and pain management. In 2010 Orexo completed its first debt issue, a convertible bond in the amount of SEK 111 million. Novo Holdings A/S has been the largest shareholder since then with approx. 28% of the shares.

**AMRA** aims to understand the relationship between fat, muscle and the development of disease, and to redefine obesity and metabolic risk using a personalised medicine approach. AMRA completed a a \$9 million funding round co-led by Pfizer Venture Investments and Novo Holdings.







# Appendix and additional slides



# Methods and sources

## Methods:

- National collaborations were defined as either a project collaboration or a publication collaboration funded by NNF with at least one collaborator/institute with origin in Sweden.
- International collaborations were defined as either a project collaboration or a publication collaboration funded by NNF with at least one collaborator/institute with origin outside Sweden.
- University rankings were based on the time period 2018-2022, across all sciences, with institutions with at least 100 publications and based on the PP(top10%).
- Co-publications were defined as publications with at least one Swedish and one Danish author.
- Swedish industry collaborators were defined as collaborations with companies registered in the Sweden.
- International industry collaborators were defined as collaborations with companies registered outside Sweden.
- Swedish grant recipients were defined as successful NNF grant applicants.
- The number of Swedish attendees at the Copenhagen Bioscience Conference series were defined as applicants and attendees registered to a Swedish research institute.
- Novo Holdings A/S investments in Sweden were defined as investments in companies with their headquarter located in the Sweden.

## Sources:

- Researchfish (NNF grant data)
  - Research publication collaborations
  - Company project collaborations
  - Publications
- NNF-Data Platform, NORMA and OMADA (NNF grant application data)
  - Applicants of Swedish origin
  - Co-applicants
  - Copenhagen Bioscience PhD programme applicants
- The Leiden Ranking 2022
  - University rankings
  - Publication impact data
- Novo Holdings A/S
  - Investment data