Stockholm Uppsala

Life Science Cluster - Capital of Life

At the Forefront of ATMP

Karolinska Institutet | KAROLINSKA UNIVERSITETSSJUKHUSET | Region Stockholm | AKADEMISKA SJUKHUSET | Region Uppsala | UPPSALA UNIVERSITET

Preface

Karolinska University Hospital, Karolinska Institutet, Uppsala University Hospital, and Uppsala University have collaborated closely for several years in the field of advanced therapy medicinal products (ATMPs). For example, in 2014 Uppsala became the first hospital in Europe to treat cancer patients in a clinical trial using chimeric antigen receptor (CAR) T-cells - an immunotherapy in which a patient's own T-cells are engineered to express a CAR molecule that targets and destroys tumor cells. The CAR T-cells were manufactured by Vecura at Karolinska University Hospital. In this historical context, it was a natural progression for the Karolinska ATMP Center and the ATMP Center Uppsala to sign a Letter of Intent in the summer of 2025, with the aim of strengthening the collaboration, clinical trials and treatments, engagement with micro-companies and SMEs (Small and Medium-sized Enterprises), education and capacity-building activities, as well as joint efforts in international partnerships.

In 2024, a Letter of Intent was also signed between Region Stockholm and Region Uppsala to strengthen the region's joint Life Science cluster, with the goal of making the Stockholm–Uppsala region one of the world's leading Life Science hubs. The Letter of Intent between our ATMP centers forms an important part of this broader Life Science strategy in the Stockholm–Uppsala region. With this report, we aim to highlight the high level of activity within the ATMP field that characterizes the Stockholm Uppsala Life Science Cluster – Capital of Life.

A comprehensive ATMP ecosystem has existed within the Stockholm–Uppsala cluster for a long time, and with excellent universities and university hospitals within the cluster, our ambition is to be a leading European hub for innovation and development in cell and gene therapies. With this report, we wish to emphasize the current level of activity within ATMP in the Stockholm Uppsala Life Science Cluster – Capital of Life, demonstrating that the cluster is a driving force in the field of advanced therapies.

Knut R. Steffensen
Director, Karolinska ATMP Center

Hannah Karlsson
Acting Director, ATMP Center Uppsala

Ewa Ellis
Coordinator, Karolinska ATMP Center

Therese Fagerqvist
Collaboration Manager, ATMP Center Uppsala

Summary

Cell and gene therapies hold immense potential to revolutionize healthcare by offering new ways to treat, prevent, and even cure diseases. The Stockholm–Uppsala region has a long tradition of being at the forefront of research and development within Life Science and is internationally recognized for its pioneering research and innovation in advanced therapy medicinal products (ATMPs). The region is also emerging as a leading international hub for companies seeking to establish or expand their ATMP manufacturing facilities. In the summer of 2025, the Karolinska ATMP Center and the ATMP Center Uppsala signed a Letter of Intent with the purpose of collaborating to further strengthen the region's leading position within ATMP.

The Karolinska ATMP Center and the ATMP Center Uppsala are engaged in a wide range of ATMP-related initiatives, including clinical trials initiated by both academia and industry, treatments using commercially approved products recommended in national care guidelines, as well as treatments conducted under the hospital exemption framework. The GMP (Good Manufacturing Practice) unit Vecura at the Karolinska Center for Cell Therapy (KCC) has more than 30 years of unique experience and expertise in ATMP manufacturing. Over 50 different gene and cell therapy products have been produced at Vecura, making it one of Europe's leading academic production facilities. Both the Karolinska ATMP Center and the ATMP Center Uppsala maintain a high level of activity within the ATMP ecosystem, and together they contribute to a strong regional position for innovation and development in cell and gene therapies.

Stockholm Uppsala Life Science Cluster - Capital of Life

Sweden is deeply committed to the development of new medicines. In 2023, research and development (R&D) expenditure in Sweden amounted to 3.6% of GDP, placing the country slightly ahead of the United States and making it a clear leader within the European Union. Sweden also ranks highly internationally in terms of pharmaceutical approvals and consistently stands among the top European countries for drug development *(QR code 1, p. 22).* The Stockholm–Uppsala region plays a vital role in Swedish innovation and has a long-standing tradition of excellence in Life Science research and development. It is internationally recognized for its groundbreaking research and innovation in advanced therapy medicinal products (ATMPs). The region is also emerging as a prominent international center for companies seeking to establish or expand their ATMP manufacturing operations.

In the summer of 2024, a Letter of Intent was signed between Region Stockholm and Region Uppsala *(QR code 2, p. 22)*. The two regions joined forces to strengthen their shared Life Science cluster. The goal is for the Stockholm–Uppsala region to become one of the world's leading Life Science regions, establishing the Stockholm Uppsala Life Science Cluster – Capital of Life.

The Stockholm–Uppsala cluster is home to several globally ranked universities in the Life Sciences. Uppsala University is a comprehensive institution, ranked among the best in the world, with over 50,000 students and 2,500 doctoral candidates. Founded in 1477, it is the oldest university in the Nordic region. The strong collaboration between Uppsala University and Uppsala University Hospital provides patients with access to the latest advances in medical research. In Stockholm, Karolinska Institutet - one of the world's most renowned medical universities - together with the Royal Institute of Technology and Stockholm University, contributes to the region's academic dynamism, hosting around 5,000 doctoral students and accounting for 29% of all doctoral education in Sweden *(QR code 3, p. 22).* These universities excel not only in research quality but also foster strong partnerships with industry, enabling effective collaboration between academia and local Life Science companies *(QR code 4, p. 22).* According to this report, the availability of talent is a distinct strength within the Stockholm Uppsala Life Science Cluster – Capital of Life, ranking third in Europe after the London and Paris regions.

Karolinska ATMP Center & ATMP Center Uppsala

ATMP stands for "Advanced Therapy Medicinal Products," a classification of human medicinal products within the European Union that encompasses innovative therapies based on genes, cells, or tissues. ATMPs include the following categories of therapies:

1. **Gene therapies:** Medicinal products containing genetic material that can modify or replace genes within a patient's cells to treat or prevent disease.
2. **Somatic cell therapies:** Medicinal products that contain cells or tissues that have been modified to alter their biological characteristics, or that are intended for use in the recipient for purposes other than those performed by the cells or tissues in the donor.
3. **Tissue-engineered products:** Products containing cells or tissues that have been modified to repair, regenerate, or replace human tissue.
4. **Combined ATMPs:** Products that combine one or more of the above therapies with one or more medical devices or other substances.

Cell and gene therapies have immense potential to revolutionize healthcare by offering new ways to treat, prevent, and even cure diseases. These therapies target the underlying causes of both genetic and acquired conditions, opening new possibilities for treating diseases previously considered untreatable. *Gene therapy* can be used to correct specific genetic defects that cause disease, by introducing a correct copy of a faulty gene or by inactivating a harmful one. An example is the treatment of diseases such as hemophilia, where gene therapy has the potential to transform the therapeutic landscape *(see QR 5, p. 22).*

Cell therapy involves the use of cells to repair or alter other cells within the body. These cells may be derived from the patient (autologous cells) or from a donor (allogeneic cells). Cell therapy has proven effective in the treatment of certain types of cancer and autoimmune diseases. For instance, tumor-infiltrating lymphocytes (TILs) are used in the treatment of skin cancer, while mesenchymal stem cells are used to modulate immune responses in autoimmune conditions.

These therapies represent a rapidly expanding and highly promising area of medical research and treatment, with the potential to offer new therapeutic options for a wide range of diseases and conditions. Currently, more than four thousand therapies are in development worldwide (2024, Gene Cell and RNA Therapy Landscape Report, ASGCT and Citeline). The U.S. Food and Drug Administration (FDA) predicts that it will approve between 10 and 20 cell and gene therapy products per year around 2025, based on the current global pipeline and the clinical success of these products. New medicines are being developed both by commercial entities and within academic institutions. The Karolinska ATMP Center and the ATMP Center Uppsala were both established to address not only the immense potential but also the challenges associated with the implementation of cell and gene therapies *(QR code 6, p. 22).*

The ATMP Center Uppsala (ATMP-U) is a collaboration between Uppsala University Hospital, Region Uppsala, and Uppsala University. It serves a coordinating function within healthcare, aimed at supporting researchers and healthcare professionals in the development and implementation of ATMPs. The center operates as a virtual organization, acting as a hub for all ATMP-related activities within the hospital and university, as well as serving as a point of contact for external stakeholders - such as companies providing new ATMPs for clinical use. It brings together all initiatives with ATMP as their common denominator, along with support functions that can provide guidance and assistance in the development or introduction of new ATMPs.

"The purpose of ATMP-U is to ensure that patients - today and in the future - have access to advanced therapy medicinal products (ATMPs)."

In 2014, Uppsala University and Uppsala University Hospital became the first in Europe to treat cancer patients with chimeric antigen receptor (CAR) T-cells - an immunotherapy in which a patient's own T-cells are engineered to express a CAR molecule that recognizes an antigen on the surface of tumor cells. Research in CAR T-cell therapies remains strong today, and researchers at Uppsala University have also developed their own CAR T-cell products currently being evaluated in clinical trials. At Uppsala University Hospital, several tissue establishments have long-standing experience in handling cells and tissues for transplantation, as well as manufacturing ATMPs under the hospital exemption.

The Karolinska ATMP Center (K-ATMP) unites the combined strengths of Karolinska Institutet and Karolinska University Hospital, both internationally recognized for their excellence in research and clinical care.

"The goal of K-ATMP is to integrate all essential stages of ATMP development within the center in order to significantly accelerate translational research and deliver clinical applications."

K-ATMP is dedicated to advancing the ATMP ecosystem regionally, nationally, and internationally. The center places strong emphasis on establishing research and development collaborations with industry, as these partnerships are vital - combining

the complementary resources of academia and industry to accelerate translational research into clinical applications and, ultimately, new treatment options for patients. K-ATMP's vision is to cure and relieve tomorrow what no one can cure and relieve today.

Within K-ATMP, process development and manufacturing of ATMPs form one of the core pillars of the center's activities. The GMP unit Vecura, part of the Karolinska Center for Cell Therapy (KCC), offers extensive expertise in Good Manufacturing Practice (GMP), cleanroom operations, quality analysis, and regulatory affairs. The facility has the competence and resources to develop customized production processes. It is authorized by the Swedish Medical Products Agency (Läkemedelsverket) for the manufacture of advanced therapy medicinal products for clinical trials and holds tissue establishment licenses from both the Medical Products Agency and the Health and Social Care Inspectorate (IVO) for the handling of cells and tissues. Vecura produced Sweden's first gene therapy product for clinical trials as early as 1997, and in 2014 manufactured the first CAR T-cells used in a clinical trial in Europe. Another GMP facility focused specifically on immunotherapy is located at the Cancer Center Karolinska (CCK) in Solna.

In 2019, the Nordic region's first pre-GMP facility was inaugurated at Karolinska Institutet's Flemingsberg Campus. The facility, consisting of five cleanrooms, serves as a vital bridge between research laboratories and Vecura, and has played a decisive role in accelerating the development of two therapeutic products that are currently undergoing clinical trials.

Initiatives and statistics

Stockholm and Uppsala host a wide range of initiatives within ATMP, including:

- Clinical trials involving both academic and commercial products
- Treatments using commercially available products recommended in national care guidelines
- Manufacturing and treatments conducted under the hospital exemption framework

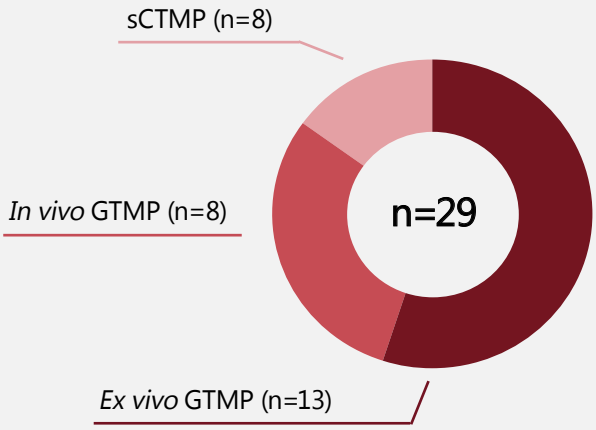
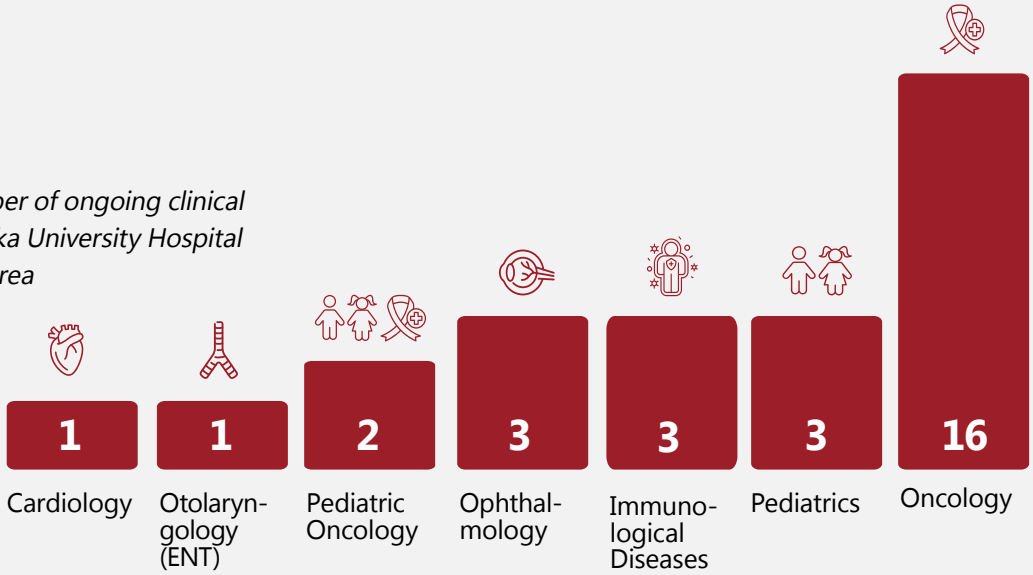


Figure 1a: Distribution of clinical trials by type of ATMP product at Karolinska University Hospital

The following pages provide an overview from both the Karolinska ATMP Center and the ATMP Center Uppsala, as well as bibliometric analyses demonstrating strong preclinical collaboration between the academic institutions. There are currently 43 ongoing clinical trials at Karolinska University Hospital and Uppsala University Hospital (Figures 1a–c and 2a–c) using *in vivo* and *ex vivo* GTMP (gene therapy medicinal products), sCTMP (somatic cell therapy medicinal products), and TEP (tissue-engineered products). The trials span multiple therapeutic areas, with the majority focused on oncology.

Figure 1b: Number of ongoing clinical trials at Karolinska University Hospital by therapeutic area



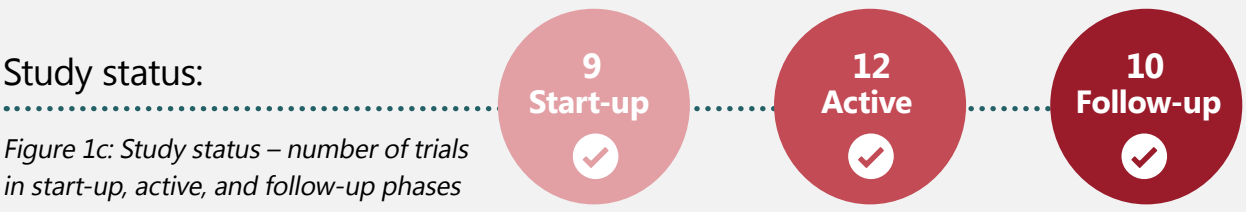


Figure 1c: Study status – number of trials in start-up, active, and follow-up phases

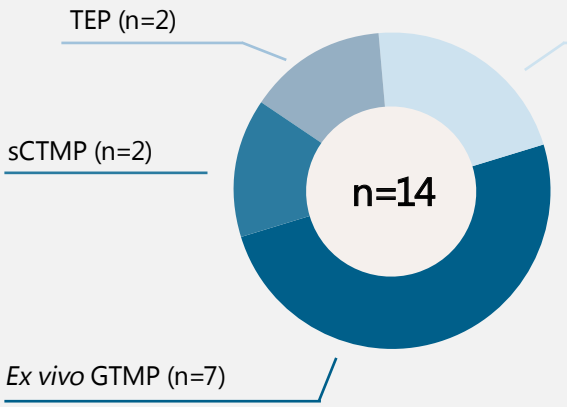


Figure 2a: Distribution of clinical trials by type of ATMP product at Uppsala University Hospital

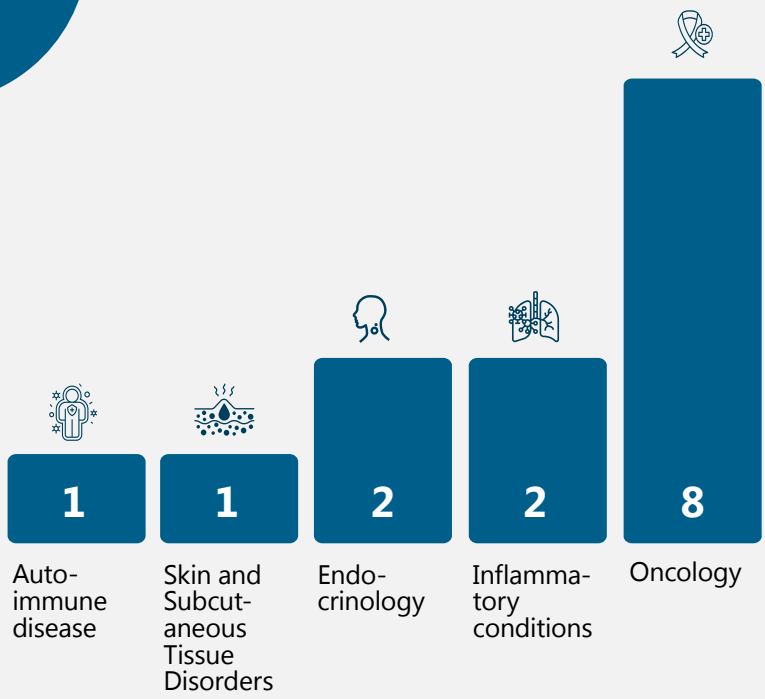


Figure 2b: Number of ongoing clinical trials by therapeutic area at Uppsala University Hospital

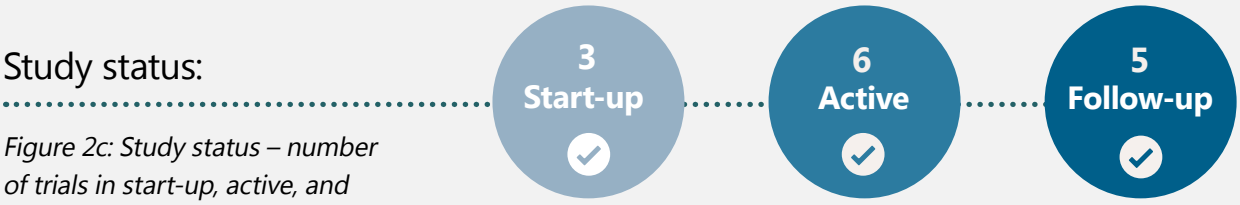


Figure 2c: Study status – number of trials in start-up, active, and follow-up phases

The 43 ongoing trials include both early- and late-phase studies and encompass both academically and industry-initiated trials (Figures 3 and 4). It is also worth noting that the Swedish University of Agricultural Sciences (SLU) in Uppsala conducts research in veterinary medicine, where immunotherapy (gene therapy) for several years has been used to treat melanoma in dogs - specifically, using the same type of treatment also administered to humans, although under a different regulatory framework than that for human medicinal products *(QR code 7, p. 22).*

Bold text indicates products developed by in-house researchers

First-in-human	Phase 1	Phase 1/2	Phase 2	Phase 3
Oncolytic virus	**TILs +/- DC-vaccine**	CLDN6	**Autologous NK-cells**	MSC
Oncolytic virus	**TILs +/- pro/TIL**	Tecartus	**MSC**	AAV
Adapt-NK	**MSC**	TCR-T	Kymriah	Carvykti
CPK850-AAV	RNA-vaccine	CAR NAP	YTB	Breyanzi
	RPE	Anti IL-1RAP	Breyanzi	CRISPR/Cas9
		pTTL	AAV	FLT201
		T-reg		GPRC5D CAR T-cell

Figure 3: Clinical studies at Karolinska University Hospital in different phases

Bold text indicates products developed by in-house researchers

First-in-human	Phase 1	Phase 1/2	Phase 2	Phase 3
CAR NAP	MSC	MSC	CAR T-cell	MSC
Oncolytic virus	Allo CAR T-cell	**Decidua stromal cells**	CLDN6 CAR-T	Carvykti
Oncolytic virus			Liposomally formulated mRNA	Carvykti
Genetically modified islet cells from pancreas				

Figure 4: Clinical studies at Uppsala University Hospital in different phases

ATMPs are also manufactured under the hospital exemption framework at both Uppsala University Hospital and Karolinska University Hospital. The hospital exemption is a regulatory authorization allowing hospitals to manufacture and administer ATMPs that do not yet hold marketing authorization, under national legislation governing the use of such therapies. These ATMPs are produced specifically for individual patients and only in very limited numbers *(QR code 8, p. 22).*

Since 2010, Uppsala University Hospital has been designated as the national center for highly specialized care (NHV) for severe burn injuries. The hospital's burn care specialists provide round-the-clock guidance to emergency departments across Sweden. The Burn Care Center is responsible for patient care throughout the entire process - from the acute phase to rehabilitation and follow-up - and treat patients of all ages who have suffered burns of varying severity. To ensure patients receive the best possible care, a multidisciplinary team collaborates to provide treatment, psychosocial support, and rehabilitation following burn injuries. One of the treatments used for severe burns involves cultured skin cells, known as keratinocytes. The method was originally developed in the United States, and the first treatment in Sweden took place as early as the 1980s. Since 2016, manufacturing and treatment with this medicinal product have been conducted under the hospital exemption framework, and approximately fifty patients have been treated since then (Figure 5).

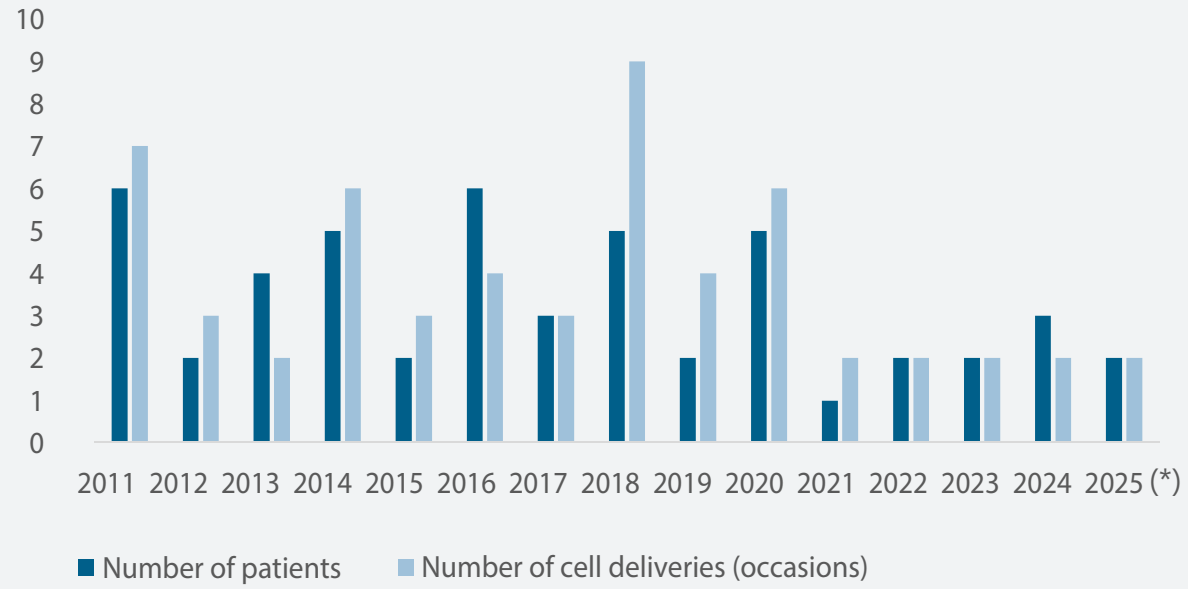


Figure 5: Manufacturing of and treatment with keratinocytes at Uppsala University Hospital (up to May 2025)

At Karolinska University Hospital, around twenty patients have been treated under the hospital exemption with therapies that include oral epithelial cell sheets, fetal mesenchymal stem cells for the indication Osteogenesis Imperfecta, and virus-specific T-cells. Allogeneic transplantation can result in severe immunodeficiency with T-cell depletion - often manageable with antiviral drugs. However, in cases where patients fail to respond to conventional antiviral therapy, few treatment options remain, and virus-specific T-cells can be life-saving. Karolinska University Hospital has produced virus-specific T-cells for the treatment of severe viral infections following stem cell transplantation.

Sweden's national competence network for CAR T-cells, SWECARNET, is an open meeting and training platform for key stakeholders in the field, working to enhance expertise, promote knowledge exchange, and establish standardized processes for CAR T-cell treatment and follow-up. SWECARNET documents the use of CAR T-cell therapies across all qualified university hospitals in Sweden (Figure 6). In clinical practice, both Uppsala University Hospital and Karolinska University Hospital have treated 63% of all patients in Sweden, building extensive experience and expertise in the clinical use of CAR T-cell therapy. Within routine clinical care, Uppsala University Hospital has treated 38 patients with four different commercial products, while Karolinska University Hospital has treated 74 patients with five different commercial products. Commercial CAR T-cell treatments in Sweden have shown excellent outcomes—likely a result of many years of experience from clinical trials with CAR T-cells, combined with a well-established national dialogue on patient selection, where the most experienced clinics (through the RCC CAR T-cell group and SWECARNET) have been able to share their expertise with the rest of the country *(QR code 9, p. 22).*

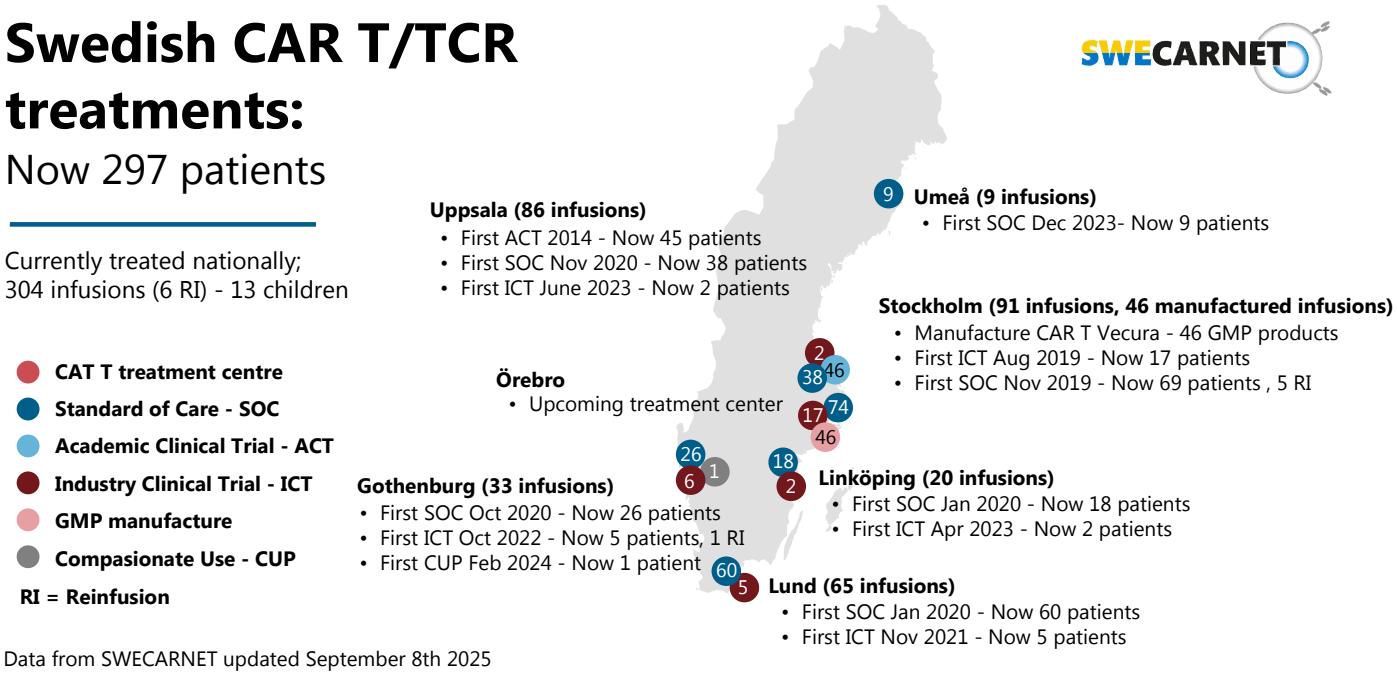


Figure 6: Number of patients treated in Sweden with CAR T-cells or TCRs

The manufacturing unit Vecura, part of the Karolinska Center for Cell Therapy, has extensive experience and expertise in the production of ATMPs. Vecura has manufactured 192 batches and 91 doses of 54 different products, resulting in treatment for 761 patients (including both manufacturing and preparation). Including 12 imports from third countries, a total of 909 patients have been treated with ATMPs produced, prepared, or imported by Vecura (Figure 7).

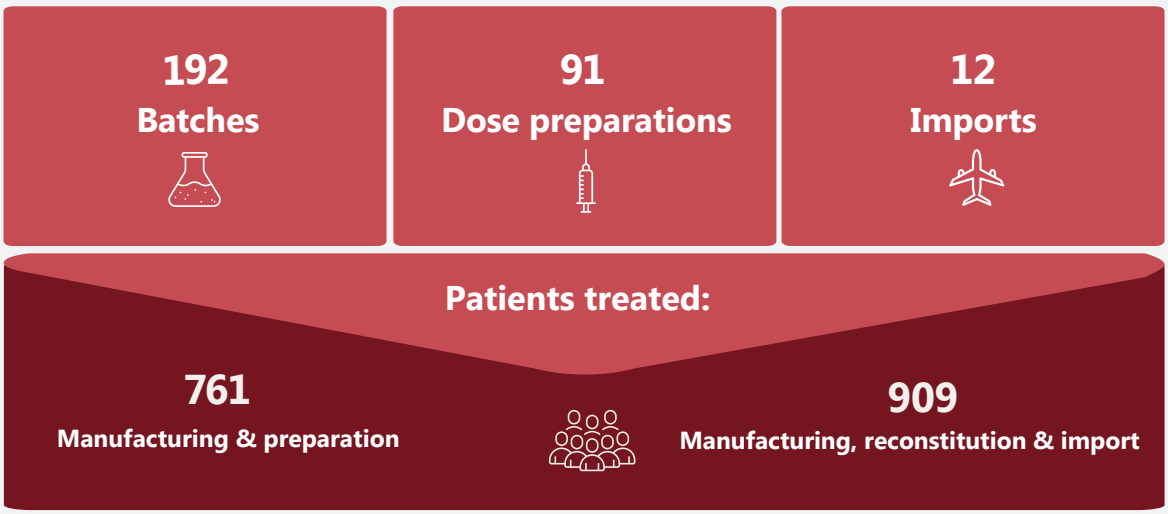


Figure 7: Manufacturing at Vecura, Karolinska Center for Cell Therapy

The products manufactured at Vecura can be divided into seven ATMP classes (Figure 8), illustrating the broad range of expertise developed through 30 years of ATMP manufacturing experience. The majority of these products are used within Sweden, but they are also exported to 11 countries (Figure 9). Thus, Vecura not only serves Swedish healthcare but also exports medicinal products internationally.

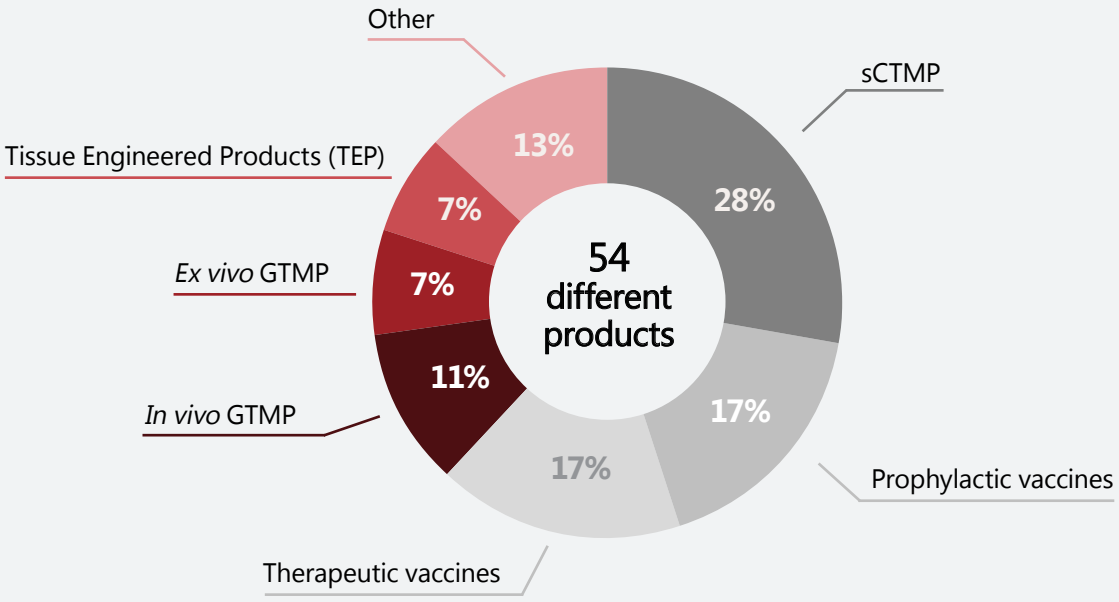


Figure 8: Products manufactured at Vecura categorized by ATMP class

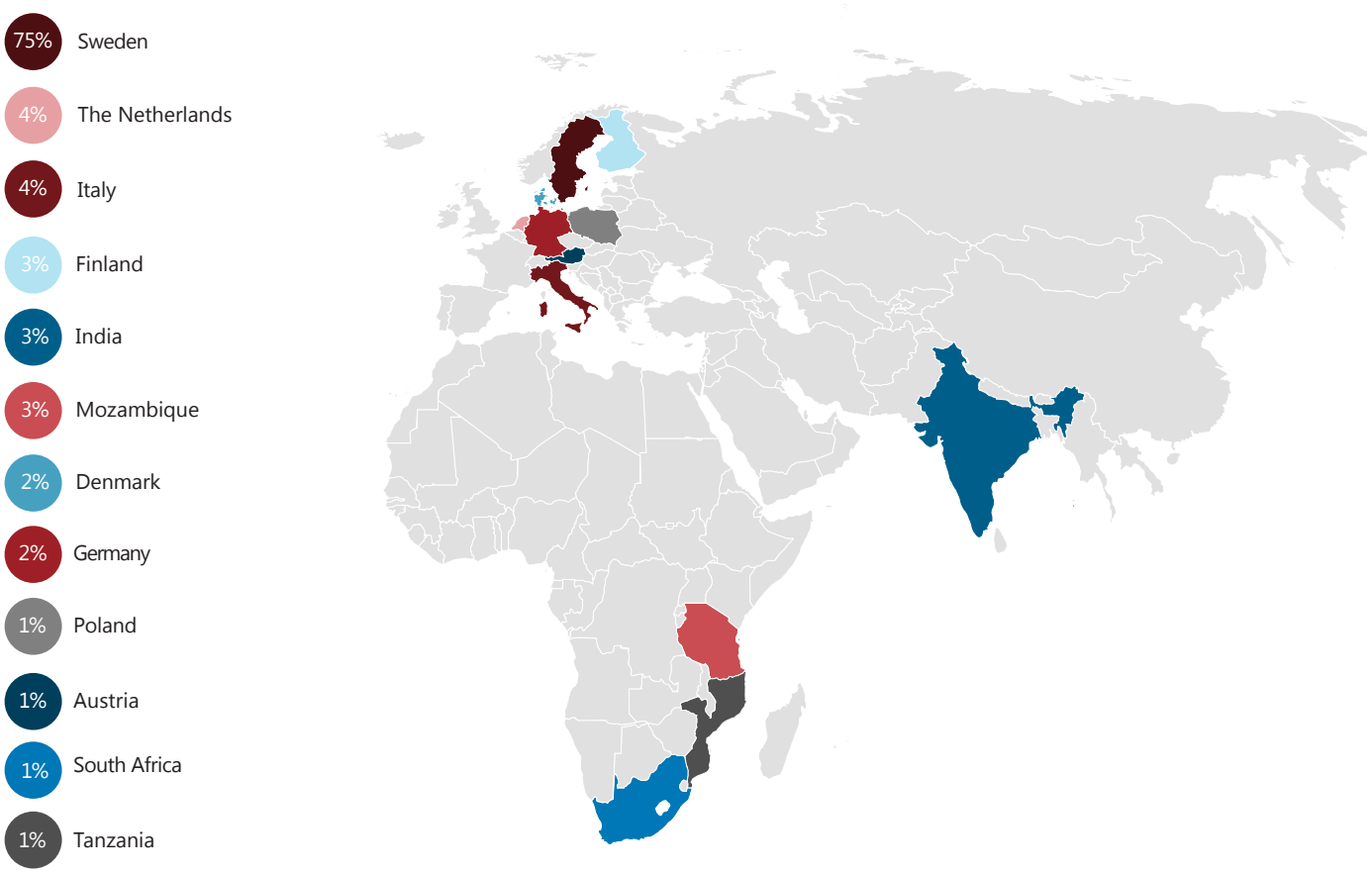


Figure 9: Recipient countries for Vecura's investigational medicinal products

Research in the field of cell and gene therapy

To further illustrate the scope of research conducted at Karolinska Institutet, Karolinska University Hospital, Uppsala University, and Uppsala University Hospital, the library at Karolinska Institutet performed a series of analyses aimed at highlighting the activity and the breadth of collaborative projects. Both universities show very high levels of activity as measured by the number of publications within the ATMP field (see description in Methods) (Figures 10a–d).

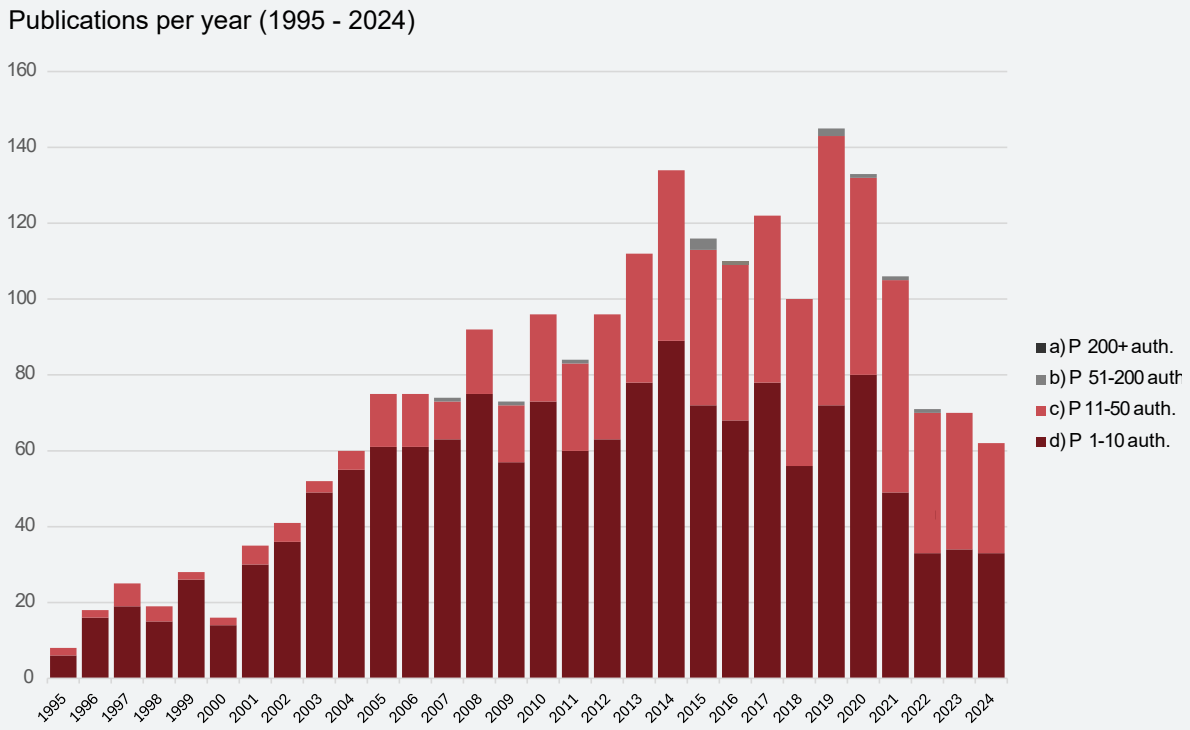


Figure 10a: Cell and gene therapy publications at Karolinska Institutet and Karolinska University Hospital per year

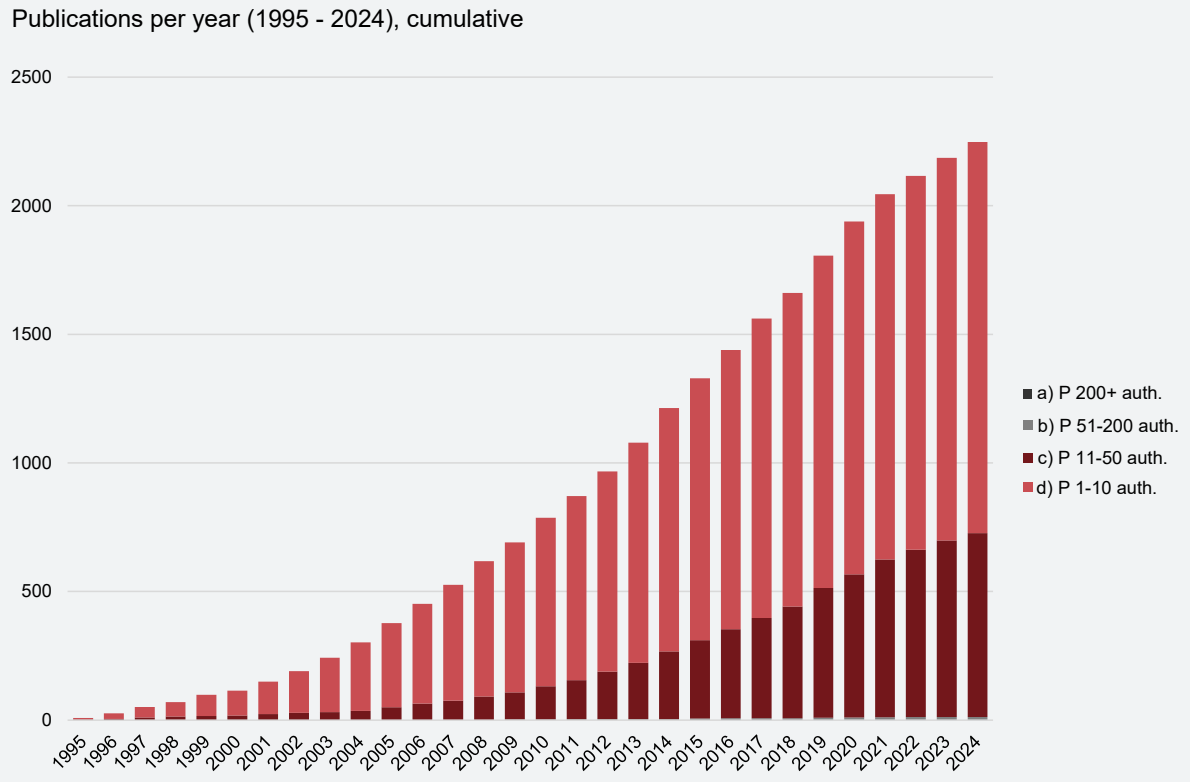


Figure 10b: Cumulative cell and gene therapy publications at Karolinska Institutet and Karolinska University Hospital

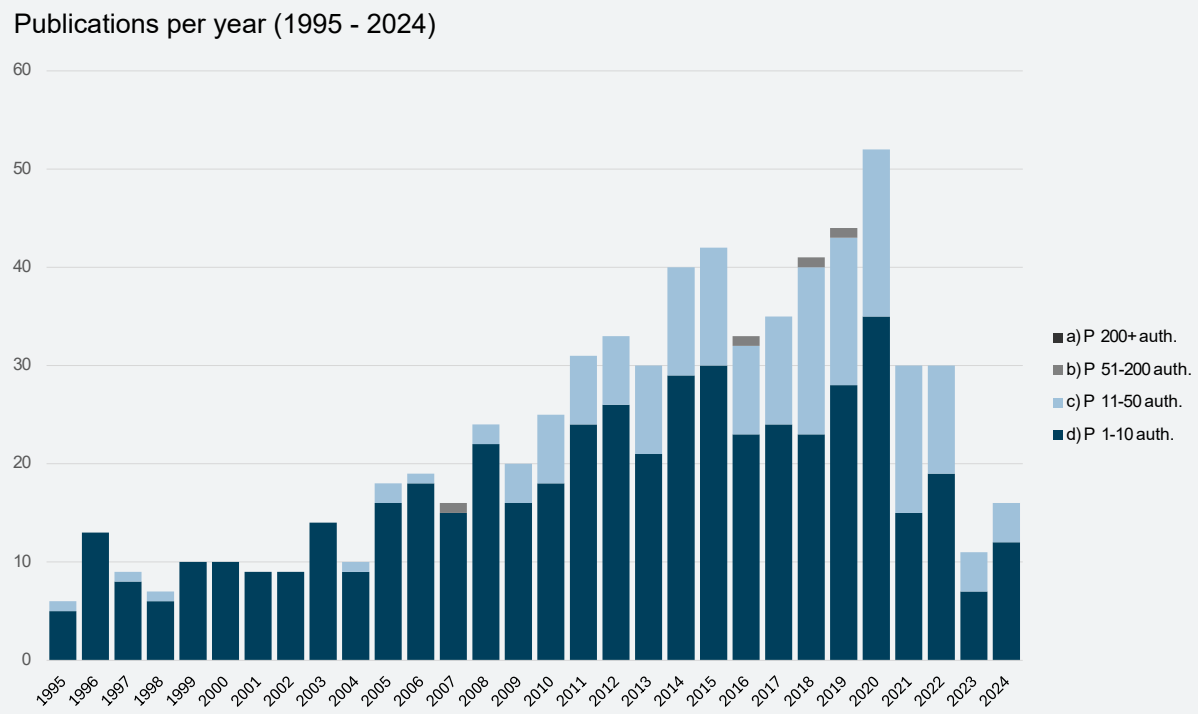


Figure 10c: Cell and gene therapy publications at Uppsala University and Uppsala University Hospital per year

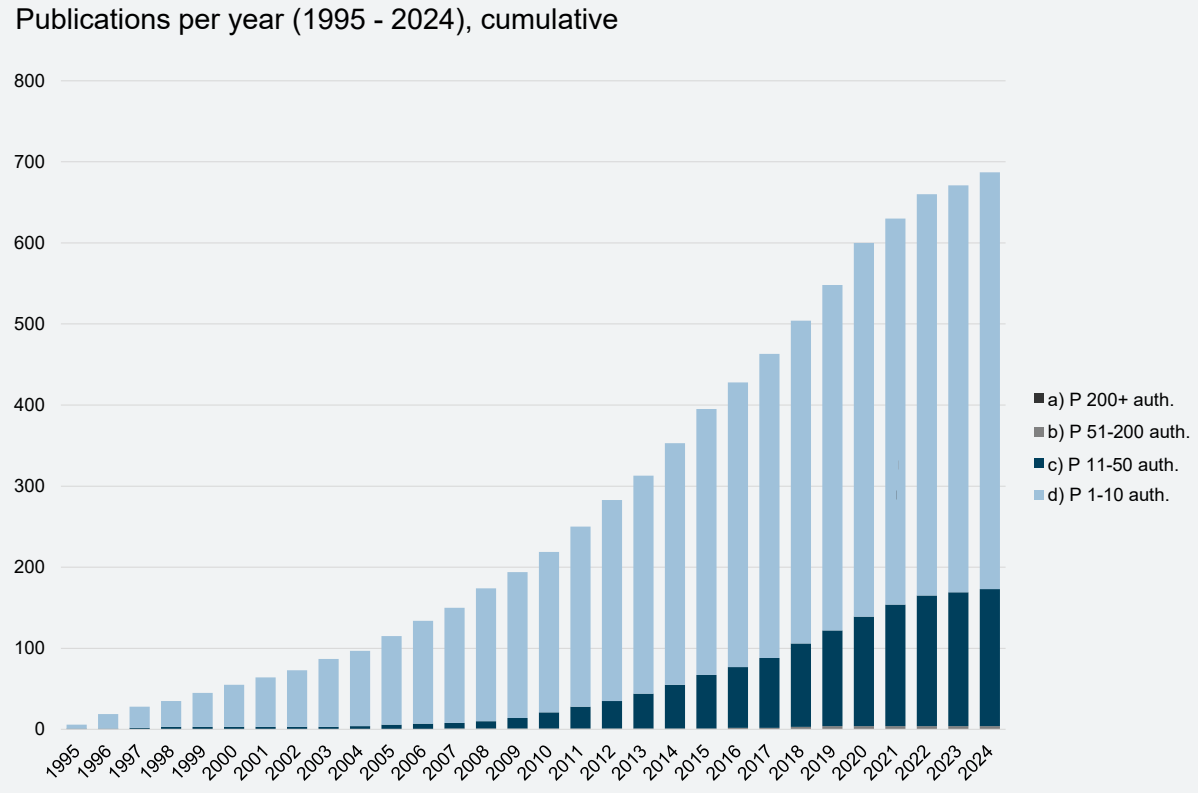


Figure 10d: Cumulative cell and gene therapy publications at Uppsala University and Uppsala University Hospital

A MeSH (Medical Subject Headings) analysis of key terms related to cell and gene therapies demonstrates a wide range of research areas at both universities (Figures 11a–b). There is a high level of research activity in induced pluripotent stem cells (iPSC), mesenchymal stem cells (MSC), and neuronal/hematopoietic stem cells at both institutions. Research at Karolinska Institutet covers a broad range of scientific fields, while at Uppsala University there is a strong focus on glioblastoma and brain neoplasms. Furthermore, the analyses show that research areas are often interconnected - for example, studies on glioblastoma and neoplasms in Uppsala are linked to research on MSCs and MSC transplantation at Karolinska Institutet.

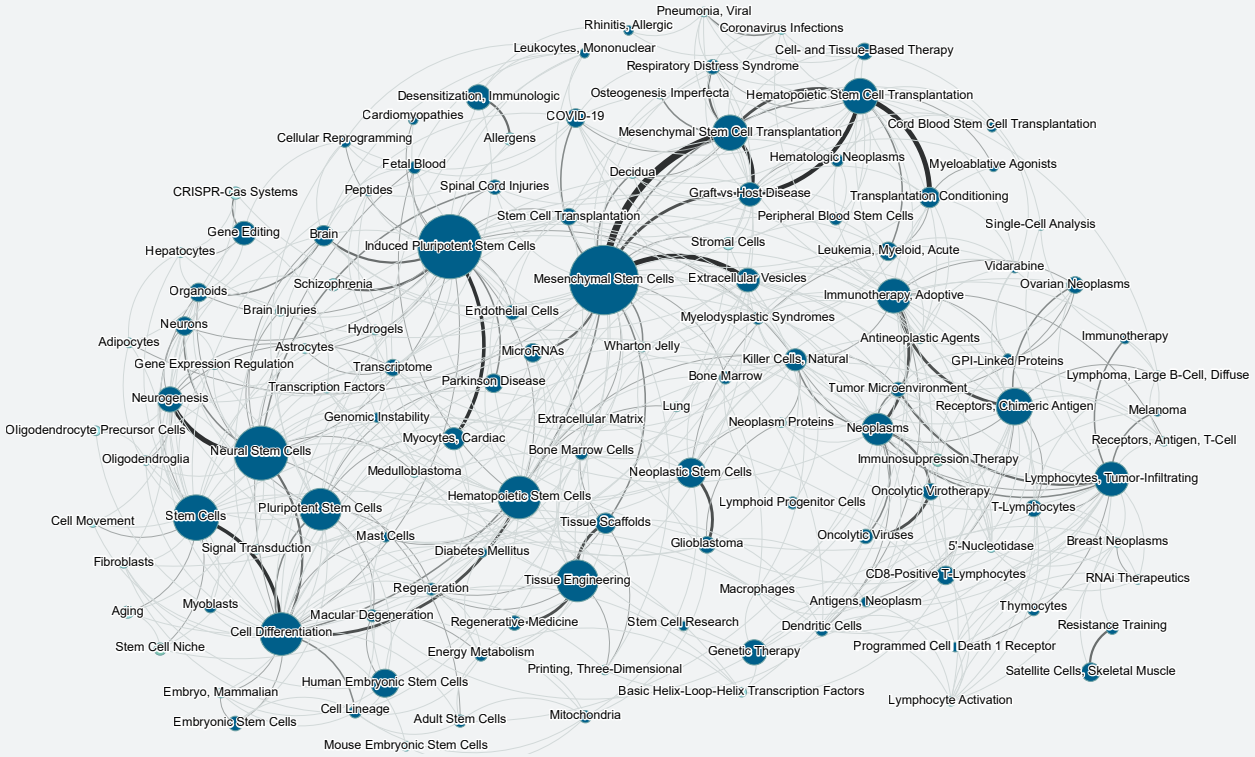


Figure 11a: MeSH network, Karolinska 2020–2024. A total of 124 terms are included (terms with at least three publications). MeSH terms used in this analysis are derived from MEDLINE®/PubMed®, a database of the U.S. National Library of Medicine. Thick lines between MeSH terms indicate stronger interconnections between terms in the publications.

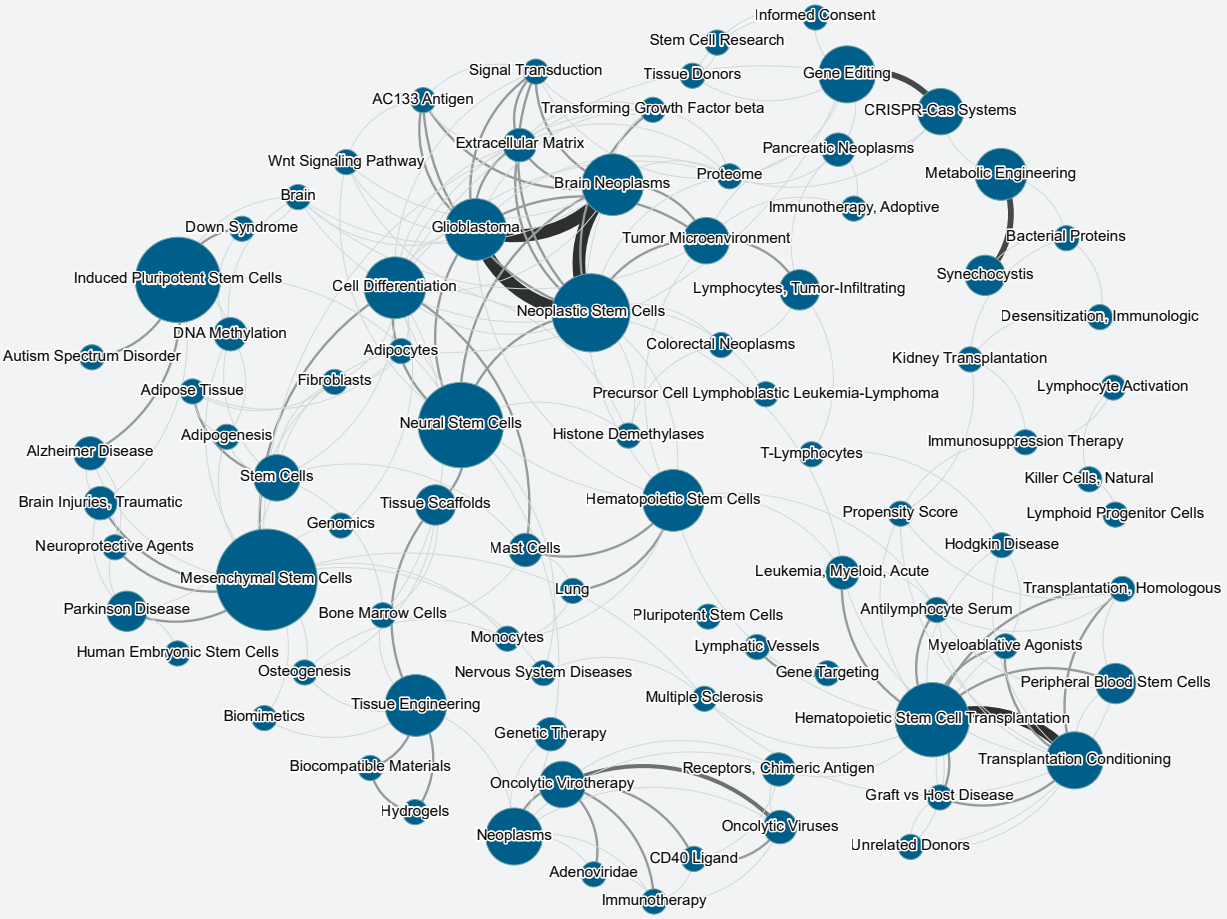


Figure 11b: MeSH network, Uppsala 2020–2024. A total of 85 terms are included (terms with at least two publications). MeSH terms used in this analysis are derived from MEDLINE®/PubMed®, a database of the U.S. National Library of Medicine. Thick lines between MeSH terms indicate stronger interconnections between terms in the publications.

Collaboration occurs across several research areas, defined by MeSH terms, between Karolinska Institutet, Karolinska University Hospital, Uppsala University, and Uppsala University Hospital, according to a co-publication analysis (Figure 12). The areas with the highest number of joint publications are hematopoietic stem cell transplantation, neuronal stem cells, and mesenchymal stem cells. Karolinska Institutet also maintains an extensive international network in preclinical research, with co-publications spanning the globe (Figure 13). Within Sweden, there is substantial collaboration with SciLifeLab, Uppsala University, Lund University, and KTH Royal Institute of Technology. Other major international partners include the University of Helsinki, INSERM, KU Leuven, the University of Cambridge, and Harvard University. Licensing restrictions prevented a similar analysis for Uppsala University, but Uppsala maintains strong collaborations with institutions such as Baylor College of Medicine and Oslo University Hospital.

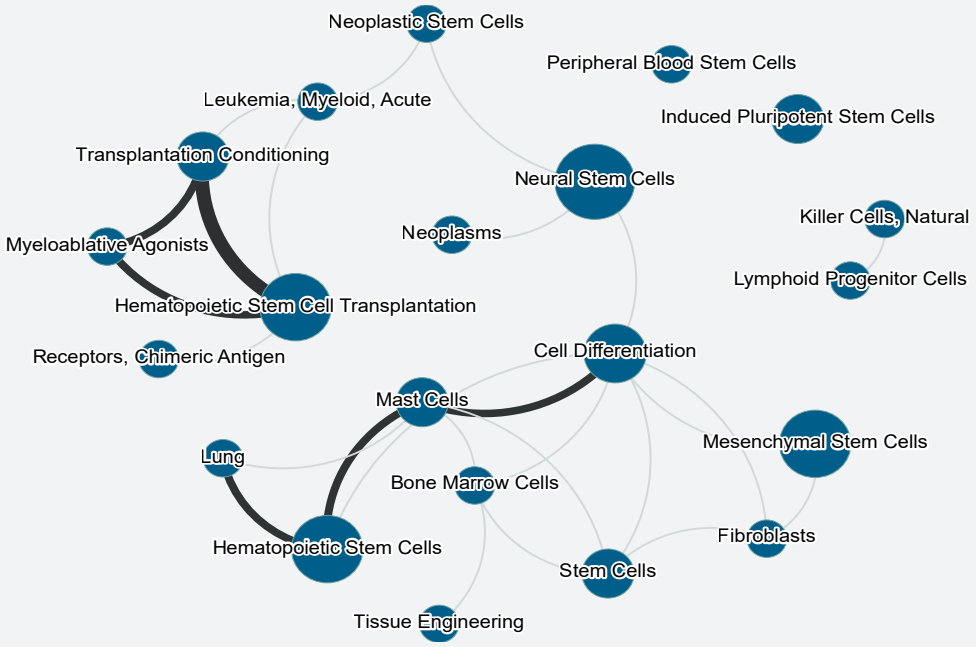


Figure 12: MeSH network of co-publications, Karolinska and Uppsala 2020–2024. A total of 21 terms are included (terms with at least two publications). MeSH terms used in this analysis are derived from MEDLINE®/PubMed®, a database of the U.S. National Library of Medicine. Thick lines between MeSH terms indicate stronger interconnections between terms in the publications.

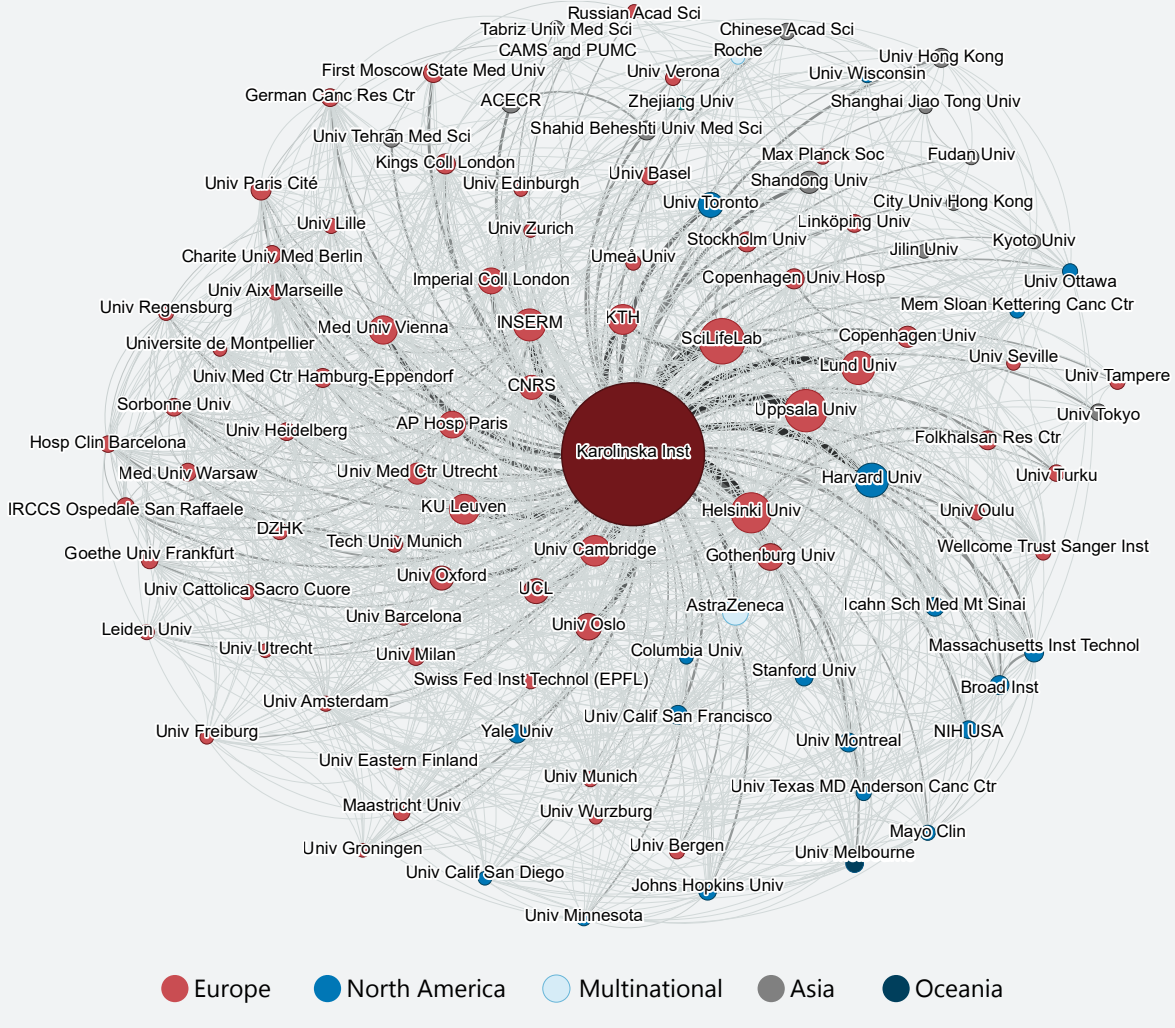


Figure 13: MeSH collaboration network for Karolinska 2020–2024. A total of 104 organizations are included (organizations with at least five publications). Lines (collaborations) are shown between organizations with at least one co-publication. Thick lines between MeSH terms indicate stronger interconnections between terms in the publications.

Clinical Trials in ATMP

For several years, there have been warnings about the declining number of clinical trials, and both Sweden and Europe have been urged to take action to reverse this trend. In 2019, the Alliance for Regenerative Medicine published a report *(QR code 10, p. 22)*, stating that Sweden had initiated only 17 clinical trials within ATMPs during the period 2014–2019, while the UK topped the list with 112. However, these figures are likely inaccurate for Sweden, as no national structure existed at the time to collect such data in a coordinated manner. The VINNOVA-funded innovation environment ATMP 2030 established a national network that brings together ATMP centers from all Swedish university hospital regions, and this function now serves, among other things, to compile data on ongoing ATMP studies in Sweden. The list of Sweden's clinical ATMP studies is published on the ATMP Sweden website *(QR code 11, p. 22*) and updated biannually.

An alternative and more up-to-date way of analyzing clinical ATMP studies shows that the Stockholm–Uppsala region currently has 43 ongoing clinical ATMP studies. With a population of 2.88 million in the Stockholm–Uppsala region *(QR code 12, p. 22)*, this corresponds to approximately 1.0 study per 100,000 inhabitants. For comparison, the United Kingdom reported *(QR code 13, p. 22)* 175 ongoing clinical ATMP studies in December 2023, and with a population of 68.35 million *(QR code 14, p. 22)*, this corresponds to about 0.25 studies per 100,000 inhabitants. Thus, clinical trials within ATMPs do not follow the general downward trend; on the contrary, the Stockholm–Uppsala region performs exceptionally well and can be regarded as a leading European hub for clinical ATMP trials.

About us

Karolinska ATMP-centrum

Contact: atmp-centrum.karolinska@regionstockholm.se
Karolinska ATMP-centrum | Karolinska Universitetssjukhuset *(se QR 15, s. 22)*
Karolinska ATMP-centrum | Karolinska Institutet *(se QR 16, s. 22)*

ATMP Center Uppsala

Contact: ATMP@akademiska.se
ATMP-centrum | Akademiska *(se QR 17, s. 22)*

Bibliometrics – Method and Data

The analysis is based on a search of publications in the field of cell and gene therapy conducted in the medical database PubMed, limited to the Medline index. The publication set was restricted to original research articles and review papers. Author affiliations were used to identify publications by researchers affiliated with Karolinska Institutet, including Karolinska University Hospital and other associated hospitals or units within Region Stockholm. Data for Uppsala University were identified in the same way, including Uppsala University Hospital. Publication counts cover the years 1995–2024, while network analyses are limited to 2020–2024. For co-publication network analyses, the Web of Science database was used. The results were compiled in April–May 2025.

The analysis revealed a general decline in publication numbers after 2021. This decrease is likely influenced by changes in how Medical Subject Headings (MeSH) are managed in PubMed. The searches were based on MeSH terms. In 2022, PubMed transitioned from manual MeSH indexing to a machine-learning–based model, implemented across the entire database from that year onward. As a result, publications in PubMed/MEDLINE have since been indexed with fewer MeSH terms on average. This likely affects the observed results after 2021, and the apparent trend breaks for those years should therefore be interpreted with caution. A new MeSH indexing model was introduced in 2024, and its effects on search outcomes remain to be determined.

The following MeSH terms were used for the bibliometric analyses:

- ("cell and tissue based therapy"[MeSH Major Topic:noexp] OR
- "cell transplantation"[MeSH Major Topic:noexp] OR
- "stem cell transplantation"[MeSH Major Topic:noexp] OR
- "cord blood stem cell transplantation"[MeSH Major Topic] OR
- "mesenchymal stem cell transplantation"[MeSH Major Topic] OR
- "immunotherapy, adoptive"[MeSH Major Topic] OR
- "immunosuppression therapy"[MeSH Major Topic] OR
- "oncolytic virotherapy"[MeSH Major Topic] OR
- "cell engineering"[MeSH Major Topic] OR
- "tissue engineering"[MeSH Major Topic] OR
- "stem cell research"[MeSH Major Topic] OR
- "genetic techniques"[MeSH Major Topic:noexp] OR
- "cellular reprogramming techniques"[MeSH Major Topic:noexp] OR
- "gene targeting"[MeSH Major Topic:noexp] OR
- "gene transfer techniques"[MeSH Major Topic:noexp] OR
- "genetic engineering"[MeSH Major Topic:noexp] OR
- "genetic therapy"[MeSH Major Topic] OR
- "stem cells"[MeSH Major Topic] OR
- "genetic vectors"[MeSH Major Topic] OR
- "lymphocytes, tumor infiltrating"[MeSH Major Topic] OR
- "receptors, chimeric antigen"[MeSH Major Topic] OR
- "gene editing"[MeSH Major Topic])

Exclusivity of Data and Bibliometric Analyses

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Contact: kib@ki.se

References

Here you will find QR codes linking to reports, sources, and interactive resources mentioned throughout this report. Scan the codes using your mobile device's camera to access the corresponding links.

1. Stockholm Business Region

2. Region Stockholm

3. Stockholm Trio

4. 2024 EMEA Life Sciences Industry & Real Estate Perspective

5 Horwitz 2025

6. Final Report: Roadmap AG PM ATMP

7. Sällström et al. 2021

8. Hospital Exemption, Swedish Medical Products Agency

9. Jerkeman et al. 2025

10. Clinical Trials in Europe: Recent Trends in ATMP Development

11. ATMP Sweden

12. County Administrative Board of Uppsala County

13. Chandaria et al. Regenerative Medicine, 2024

14. Trading Economics

15. Karolinska University Hospital, ATMP Center

16. Karolinska Institutet, ATMP Center

17. ATMP Center Uppsala