Annual review 2023

Karolinska Institutet

KAROLINSKA UNIVERSITY HOSPITAL

Karolinska Comprehensive Cancer Center

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Welcome to the Karolinska CCC annual review 2023

In recent years, Comprehensive Cancer Centres have become increasingly important players in the EU for high quality cancer treatment, education and research. During the year, Karolinska CCC has strengthened its presence in international forums and projects to contribute in many different ways to increased survival and quality of life for cancer patients. We have chosen to present some of these activities in this report.

The development since becoming a CCC in 2020 has continued in 2023 with an increased number of patients treated, an increased number of patients included in clinical studies and increasing research and development grants. We have made great strides in our strategic development areas such as precision health, cell and gene therapy, robot-assisted surgery and advanced phase 1 studies to name a few.

In parallel, work has continued to systematise, organise and simplify the collection of healthcare data generated by our patients. In 2024, we will be able to combine data from many different data sources in completely new ways for research, quality and process development.

Skills management strategies for the healthcare sector are a matter of concern for society as a whole. The realisation that today's work practices' will not be tomorrow's work practices to build sustainable cancer care is now growing rapidly at Karolinska CCC. The way forward is one of change, e.g. through simplification and digitalisation using new technologies wisely, but above all through greater patient involvement (read more about this in the report).

The integration of care and research in every patient encounter is a crucial line of development that Karolinska CCC supports in many ways, one of the most important being the continued integration between Karolinska University Hospital and Karolinska Institutet. In 2023, additional centres have been established to accelerate the development of knowledge and care within the cancer field, which are good examples of such an integration. Karolinska ATMP Centre for cell and gene therapy and Theranostic Trial Centre for advanced nuclear medicine methodology.

Karolinska CCC comprises care, research and education within the cancer field – a hub that connects the entirety. The mission of Karolinska CCC is more than just regional, we are a resource for Sweden and the whole world.

Patrik Rossi
Managing Director, Theme Cancer. Chairman, Board of Directors, Karolinska CCC.

Contents


Sjuksköterska

World-leading care and research in cancer

Karolinska Comprehensive Cancer Center gathers Cutting-edge expertise in highly specialised cancer care and cancer research. The center is a joint investment by Karolinska University Hospital and the Medical University Karolinska Institutet. It is also the first accredited Comprehensive Cancer Center in Sweden.

Our objectives

- Develop national and international networks to give our patients access to the best international knowledge and ensure that our work practices are always the best possible to fulfil all cancer-related needs of cancer patients.
- Increase knowledge and lead the development of clinical application of person-centered care and precision medicine diagnostics and treatment.
- Lead the development of evidence-based practice, national and international treatment programs and guidelines. Develop more high-profile research platforms within precision medicine, cell and gene therapy and by providing a high-quality FAS I resource for medicinal product studies and a professional clinical study organisation.
- Ensure that Karolinska CCC is the relevant and natural collaborative partner in national and international research and development projects within the life science sector and academia.
- Systematically develop collaborations and partnerships with patients to increase patient involvement in the development of cancer care, research and education to a larger extent.
- Systematically develop data quality and availability for easier and more continuous and transparent follow-up of quality of care, treatment outcomes, accessibility and patient experience within cancer care and research.

Board of Directors (BoD)

In 2023, the BoD has been expanded with Mathias Axelsson, Head of the Medical Diagnostics Function at Karolinska (MDK), Päivi Östling, Karolinska Institutet and SciLifeLab, Anita Wanngren, Patient Representative, and Pernilla Grillner has replaced Nina Perrin as Head of Operations for Paediatric Oncology/Haematology, Theme Children.

In January, Eva Jolly was appointed Head of Operations for Karolinska CCC and Ann-Britt Johansson was appointed to the role of coordinator with main responsibility for the re-accreditation re-accreditation according to the OECI quality programme.

The BoD assembled once a month and the work has focused on the continued development of

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Managing Director, Theme Cancer, Karolinska University Hospital. Chairman, Board of Directors, Karolinska CCC.

Jonas Bergh
Professor in Oncology. Director CRKI, Karolinska Institutet. Prefect, Theme Cancer, Karolinska University Hospital.

Anna Martling
Professor in Surgery. Dean, Karolinska Institutet North. Senior Consultant, Theme Cancer, Karolinska University Hospital.

Pernilla Grillner
Acting Head of Operations at Highly Specialised Pediatrics 1, Theme Children, Karolinska University Hospital and Researcher at Karolinska Institutet.

Stephan Mielke
Professor in Hematology and Cell and geneTherapy, Karolinska Institutet. Head of department, CAST. Research Director, Theme Cancer, Karolinska University Hospital.

Anita Wanngren
Patient Representative.

Mathias Axelsson
Managing Director, Medical Diagnostics Karolinska, Karolinska University Hospital.

Yvonne Wengström
Professor in Nursing, Karolinska Institutet. Head of Nursing development, Theme Cancer, Karolinska University Hospital.

Janne Lehtiö
Professor in Proteomics, Karolinska Institutet. Research Director, SciLifeLab.

Päivi Östling
Scientific Director for Precision Medicine, SciLifeLab. Senior Researcher, Karolinska Institutet.

Eva Jolly
Operations Manager, Karolinska CCC.

Ann-Britt Johansson
Coordinator, Karolinska CCC.

collaborations with national and international organisations and networks, as well as active participation in conferences and meetings within cancer research and cancer care. Important activities during the year have been the development and anchoring of a long-term research strategy, the organisation of the conference Cancer, equality and Europe's Beating Cancer plan, the visit of the Scientific Advisory Board in May and participation in the Almedalen Week in Visby.

The initial work on the re-accreditation process started in the autumn where invitations were extended from the Board of Directors to an internal kick-off with involved managers, researchers and patient representatives. Re-accreditation will be one of the primary activities in 2024.

Anna Martling, Board of Directors, Karolinska CCC.

Scientific Advisory Board (SAB)

In May, we were again pleased to welcome the members of the Scientific Advisory Board (SAB). The program consisted of presentations and discussions on several areas within both basic and clinical research.

SAB chairman Erlend Smeland together with the other members conveyed their views on the continued development of Karolinska CCC with their combined experience and broad expertise within cancer research. The SAB report we received after the visit contains recommendations for the next level of excellent research.

Members of the SAB for Karolinska CCC:

- Alison Richardson, University of Southampton and University Hospital Southampton
- Cornelis van de Velde, Leiden University Medical Centre
- Erlend B. Smeland, Oslo University Hospital and University of Oslo (chair)
- Josep Tabernero, Vall d´Hebron Institute of Oncology and Medical Oncology Department
- Julian Downward, Francis Crick Institute in London
- Laura Esserman, University of California, San Francisco (UCSF) Carol Franc Buck Breast Care Centre
- Nancy Berliner, Brigham and Women's Hospital and Harvard Medical School
- Rupert Handgretinger, Tübingen University Hospital and University of Tübingen, Germany

Research strategy Karolinska CCC 2023–2026

In January 2023, researchers, leaders, patient and relative representatives came together to discuss the current situation, challenges and opportunities with the aim of formulating a common strategy for research. Including different perspectives is an important part of addressing the complex challenges facing cancer research and treatment. Based on the results of these discussions, a joint strategy has been developed to overcome the challenges.

Summary of the Research Strategy

Cancer research is a key pillar for improving cancer care and making it more accessible, equitable and cost-effective for all patients. Cancer research leads to a deeper understanding of the disease, its causes and risk factors, which can lead to the development of new treatments and medicinal products.

Through research, we can improve diagnosis, which can lead to earlier detection and treatment, which in turn can lead to better survival and prognosis for patients. Research can identify effective treatment methods that are more cost-effective and thus contribute to more cost-effective treatments. Through research, we can increase our understanding of how cancer affects communities and populations, which can help develop more targeted and tailored treatments that are more equitable and inclusive. This means that there should be a strong societal focus in the research, aiming to reduce health inequalities within healthcare and make treatments available to everyone regardless of their background or financial situation.

Open, curiosity-based research is a prerequisite for breakthroughs, and unconditional research should therefore be prioritised. Some strategic guidance may be needed to stimulate and contribute to strengthening neglected areas. There should be a balance between competition and cooperation. Karolinska CCC shall adopt a horizontal research perspective with breadth in the design of studies.

Involving patients and relatives in research is important to ensure that the research is relevant and focused on the needs and wishes of the patient. Patient-centred cancer research is essential to bridge healthcare research, policies and clinical practice.

An “opt-out” procedure can be an effective way to increase patient involvement in research while ensuring ethical review and data protection. By informing patients that their health data may be used for research and giving them the opportunity to opt out from participation, it allows patients to make informed choices about their participation in research.

The goal is to create optimal patient benefit, where all patients are offered the opportunity to be involved in research and offered participation in studies.

National and international cooperation

In 2023, Karolinska CCC continued to contribute to the development of the national CCC network, which consists of representatives from the three accredited Swedish Comprehensive Cancer Centres (CCC) and which was expanded during the year with participation from all university hospitals.

The network aims to create forums for the exchange of experience, information and prerequisites for development and cooperation within the framework of the CCC mission.

Karolinska CCC also actively participates in the Nordic/Baltic CCC network which met twice in 2023. Karolinska CCC hosted the meeting in December with 60 participants from all the Nordic countries, including Iceland, and from Latvia. During the day, ongoing EU projects within the field of cancer were presented with a focus on the collection of clinical data and how data sharing can be enabled and made available for both development and research. The day ended with a panel discussion where clinical research leaders from the participating countries discussed opportunities and challenges within and between our countries.

Many employees have represented Karolinska CCC at scientific conferences and meetings during 2023. In June, Karolinska CCC was responsible for a seminar in Folkhälsodalen during Almedalen Week in Visby. The theme was ‘Comprehensive Cancer Centre – What is it’ and Göran Hägglund was the moderator, The panel included Eva Jolly, Patrik Ross and Anna Martling from Karolinska CCC and Mef Nilbert from the National Board of Health and Welfare, Edvard Abel from Sahlgrenska CCC, Silke Engelholm from Skåne University Hospital CCC and Kjell Ivarsson, National Cancer Coordinator from RCC in Samverkan.

Karolinska CCC participates in two European projects within the framework of Horizon Europe, Cancer Mission.

ECHoS

ECHoS is a project that aims to ensure the implementation of the Cancer Mission's activities in all member countries by establishing and developing Cancer Mission Hubs operating at national, regional and local level. By bringing together the experience and expertise of 58 leading organisations from government, healthcare, research and innovation, academia and the non-profit sector, support will be provided to member states and associated countries to gradually create National Cancer Mission Hubs (NCMHs). These NCMHs will be crucial in involving all relevant stakeholders to get engaged in collaborative initiatives and policy dialogues on cancer at national and regional level. The start-up meeting took place in Lisbon in May 2023 and Karolinska CCC represented Sweden together with representatives from the Government Offices of Sweden, Vision Zero Cancer and RCC in Samverkan.

CCI4EU

CCI4EU is a coordination and supportive measure with the aim to develop and improve existing or future Comprehensive Cancer Infrastructures (CCI) in the EU by promoting research, innovation, and digital capacity development within cancer care. The objective is capacity building efforts in the member states to create or develop CC infrastructures. Actions include regional training conferences, online learning and so-called Deep Dives where teams of experts will visit selected countries to provide support and develop/increase the degree of "maturity" of their CCI. Karolinska CCC is leading one of the work packages aimed at developing a self-assessment model of the degree of maturity of each Member State's CCI/CCIs.

Vision Zero Cancer

Karolinska CCC is a partner in Vision Zero Cancer, Sweden's cross-sectoral innovative environment against cancer, which has participated in several activities within the framework of the operations. Vision Zero Cancer receives funding from Vinnova, as part of their investment in vision-driven innovative environments to meet health challenges. The Chairperson of Vision Zero Cancer is Kjell Ivarsson, National Cancer Coordinator, Regional Cancer Centres in Samverkan and Eva Jolly from Karolinska CCC is Vice Chair. Vision Zero Cancer is led by Ebba Hallersjö Hult from the House of Innovation, Stockholm School of Economics.

Within the framework of Vision Zero Cancer, Karolinska CCC has participated in seminars, workshops and conferences both nationally and internationally with the aim of contributing to the vision that no one should die from cancer and that more people should live longer and better. Together with Genomic Medicine Sweden (GMS) and SciLifeLab, Vision Zero Cancer is the initiating party of Testbed Sweden Precision Health Cancer, an innovation environment for clinical studies that works to facilitate the introduction of more accurate prevention and treatment in cancer care.

SciLifeLab.

The collaboration provides capacity for the best cancer care in Europe – message at this year's Karolinska CCC Days

This year's Karolinska CCC Days took place on March 30–31. Nearly 500 cancer professionals from Karolinska University Hospital and Karolinska Institutet (KI) gathered in the Aula Medica. The programme had been extended to two days and this year the newly accredited Sahlgrenska CCC and Skåne University Hospital CCC also participated.

The Karolinska CCC Days were opened by Simon Oberst, Chairman for accreditation and quality at the Organisation of European Cancer Institutes (OECI). In its survey of networks and infrastructure for Comprehensive Cancer Center, he emphasized the key words for success; collaboration, cooperation and networking. Right now, there are there are 123 members in Europe divided into different groups, based on, for example, volumes within the research and number of patients.

Simon Oberst, Organisation of European Cancer Institutes (OECI).

> "Karolinska CCC is one of the biggest players within OECI and is at the forefront of advanced health and cancer research, the EU needs your expertise,"says Simon Oberst.

The two days provided clear examples of what is possible today and what we can do tomorrow. An impressive range from deep diving into precision medicine and stem cells, to AI solutions within imaging. Immersion in key EU projects and insight into organised prostate cancer screening, to research and new methods within pediatric cancer. Just to mention a few of the many scheduled events that gave a convincing picture of the collaboration and capacity found within the Karolinska CCC.

Patrik Rossi, Chair, Karolinska CCC.

The challenge for Karolinska CCC is to increase and improve the interaction between healthcare and the more than 400 research groups working within the field of cancer at KI. Among other things, greater interaction is needed for faster implementation and increased learning between everyday healthcare and research.

This year's Karolinska CCC Days saw an increased focus on pediatric cancer with presentations of a number of ongoing projects. For example, Carina Rinaldo, a PhD student at KI, presented her study on children and adolescents who donated stem cells to their severely ill siblings via bone marrow transplantation. The method is successful but also has ethical issues that affect an entire family when one of the children is diagnosed with cancer.

In Sweden, around 350 children are diagnosed with various forms of cancer. Survival rates have increased significantly in recent years, and precision medicine offers further hope. Through tumour genetics and clinical genetics to detect predisposition, diagnosis becomes more accurate.

Anna Nilsson, Associate Professor KI, Pediatric Oncology Patient Flow and Pernilla Grillner, acting Head of Operations at Highly Specialised Pediatrics 1, Theme Children, Karolinska University Hospital.

Karolinska CCC strengthens its role in Europe

The year has been characterised by great commitment not only nationally but also within the Nordic Baltic CCC Network and specifically for Europe during the period of Sweden's EU presidency. In collaboration with the Swedish Cancer Society and CCCs in the country, over 200 researchers, politicians, patient representatives and officials from EU member states were invited to participate in the conference "Cancer, equality and the EU's Beating Cancer Plan" at Karolinska University Hospital. These included Minister for Health Acko Ankarberg Johansson, Olivia Wigzell, Director General of the National Board of Health and Welfare, and Philippe Roux from the European Commission.

Researchers submit their recommendations to the Minister of Health.

During the conference, two research collaborations presented their recommendations within the areas of "Cancer with a poor prognosis" and "Living well after a cancer diagnosis and treatment – the journey back to work". The recommendations are the result of collaborations since the French EU presidency with researchers from several European Comprehensive Cancer Centres. The work will continue in 2024 and be highlighted in several EU projects.

Matthias Löhr, Professor of Gastrology and Hepatology at Karolinska Institutet and Senior Physician at the Upper Abdominal Medical Unit, Karolinska University Hospital, wants to draw attention to cancers with a poor prognosis as an important aspect of equity in healthcare.

> "Cancer of the pancreas and lower bile ducts is relatively rare, yet it is the second most common cause of death from cancer. This is because the survival rate is less than 10 percent. Yet there is comparatively little research funding in this area. The need to spread knowledge to shorten the time to diagnosis and treatment is very important," he says.

Yvonne Wengström, professor at the Department of Neurobiology, Healthcare Sciences and Society at Karolinska Institutet and Nursing Manager for Theme Cancer at Karolinska University Hospital, believes that increased cooperation, such as harmonised data collection on sick leave and factors affecting it, will enable comparisons both nationally and at the European level.

> "Evaluate. What works, for whom does it work, why does it work? It is the knowledge of these 120 researchers, who started this journey by thinking about the "journey back to work", that we now need to utilise together." This is not a new area of research, but what we have learned now is the importance of collaboration and highlighting the good examples," she says.

Does it feel hopeful?

> "A lot. It is great to get feedback from the Ministry of Social Affairs that they are working on quality of life issues and confirmation that rehabilitation is neglected and important. That is what all this is about," she concludes.

Researchers collaborate on living well after cancer diagnosis and treatment – the way back to work.

Researchers collaborate on cancers with a poor prognosis.

Research and Education

Cancer Research KI

The umbrella organisation for all cancer research at Karolinska Institutet (KI) is Cancer Research KI (CRKI) (ki.se/en/cancerresearchki/cancer-research-ki). CRKI coordinates and works to strengthen research within cancer biology with clinical cancer research across KI and Karolinska CCC by bringing together researchers from different disciplines, supporting collaborations both nationally and internationally, and announcing various forms of research grants.

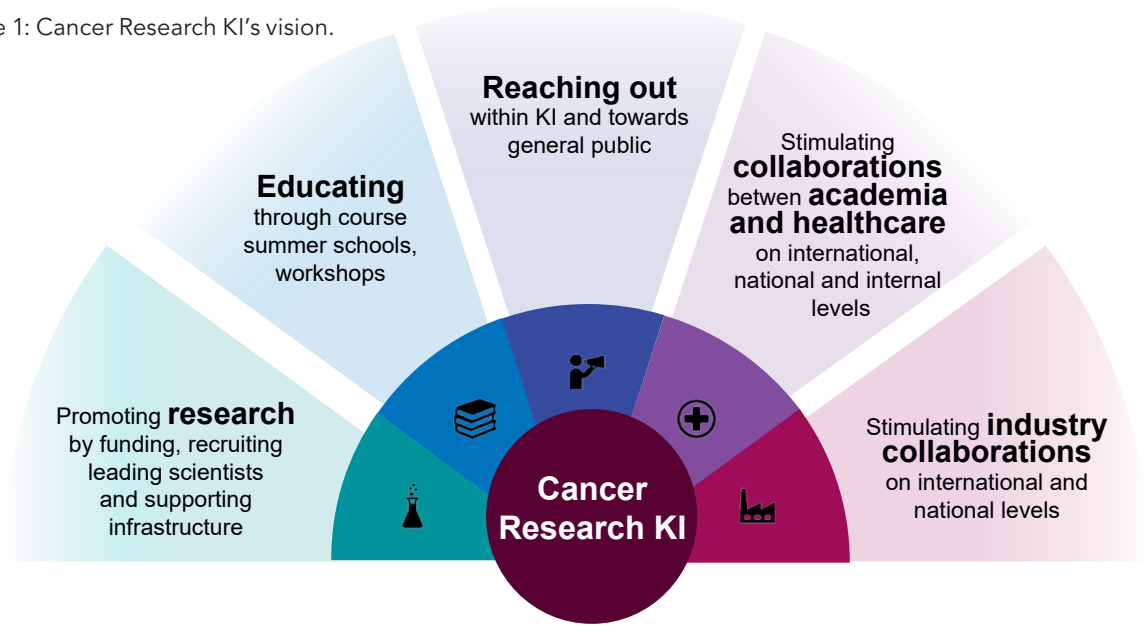
The overall aim is to increase knowledge of all aspects of cancer biology, improve prevention, diagnosis and therapy, reduce the risk of relapse and improve the quality of life of cancer patients and their relatives.

Support for CRKI comes from the government through the initiative with the so-called Strategic Research Areas (SFO). The program has, among other things, enabled investments in improved infrastructures, support for central recruitment of cancer researchers nationally/internationally, support for younger researchers, announcement of cancer research projects with different focuses, establishment of collaborations nationally and internationally, the latter especially within Cancer Core Europe (www.cancercoreeurope.eu) and with the Mayo Clinic (www.mayoclinic.org).

For several years, CRKI has also been supporting graduate schools for preclinically and clinically focused PhD students, with the aim of increasing the knowledge of modern cancer biology and to better understand cancer diseases and how to best treat them with precision medicine concepts. The CRKI President participated in the planning committee for the 2023 Nobel Conference on Precision Medicine.

During the year, CRKI has also organised a number of additional initiatives that put cancer research in the spotlight through both digital and live events of various kinds. CRKI's annual retreat at Djurönäset in September is a popular meeting that brings together a large number of KI cancer researchers for networking and scientific exchange. Speakers in 2023 included several internationally invited speakers, such as Professor Maria Blasco, from the Spanish National Cancer Research Centre, and Professor Matt Goetz from the Mayo Clinic in the US. A major event was also when CRKI organized a large national meeting for cancer researchers from all CCCs in Sweden, which on 16–17 May gathered about 500 cancer researchers from Skåne, Gothenburg, Uppsala and Umeå in Aula Medica for the 6th Cancer Swedish Research Meeting (SCRUM), a very appreciated meeting.

Figure 1: Cancer Research KI's vision.



In 2023, CRKI has also continued its successful collaboration with the Mayo Clinic in the US, and the collaboration was deepened during the year, which means that we see new opportunities for the future. The Mayo Collaborative Grant awarded grants to three new Mayo KI collaborations during the year, and organised a Joint Symposium with the grant recipients, held on 22 June.

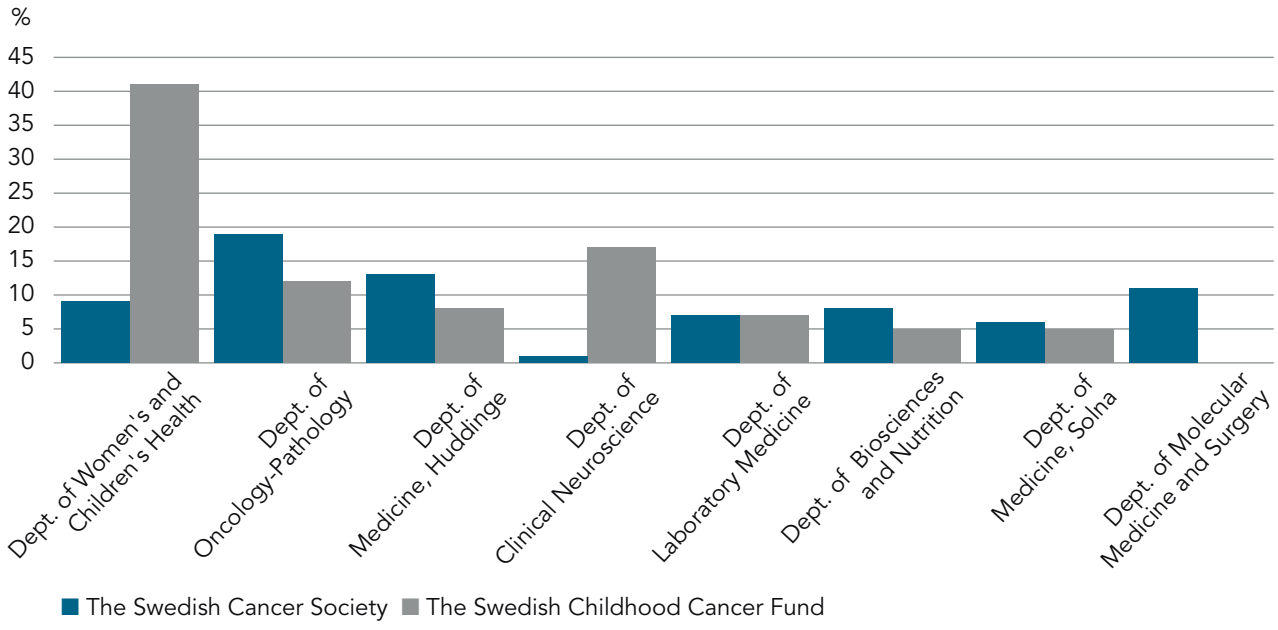
CRKI organised two seminars in its series of Clinical Cancer Talks, and on February 13 Professor Janne Lehtiö presented proteogenomics in Precision Medicine and on April 3, Professor Rimma Axelsson presented on Modern Imaging. On October 5, a joint workshop in cancer for patient organisations was held in collaboration with the Regional Cancer Centre (RCC) for Stockholm-Gotland, with the aim of increasing interaction between researchers and doctors as well as communication with and between different patient organisations and the public. This was highly appreciated by both patients and patient organisations, highlighting new research in palliative care, new treatment methods and breast cancer research.

CRKI together with Cancer Core Europe (CCE) organised a summer school on the topic of translational cancer research in Algarve, Portugal, on October 8–14 (summerschool.cancercoreeurope.eu) which provided many opportunities for increased international exchange.

Good collaboration with the industry is important for cancer research. In 2023, KI and especially CRKI partnered with Cancer Research Horizon to further promote innovation within cancer research. On March 23, a workshop was held through this initiative, where several researchers who have started businesses based on innovations with their medical discoveries presented their experiences.

Overall, as in previous years, CRKI has in 2023 continued its broad and important work to strengthen cancer research at KI and KCCC. Finally, to access all the research carried out within CRKI, please refer to the network's curated database of the more than 400 research leaders who form the basis of CRKI (ki.se/en/cancerresearchki/cancer-research-ki-maps-cancer-research-across-ki).

Figure 2: Distribution of research grants from the Swedish Cancer Society and The Swedish Childhood Cancer Fund to Karolinska Institutet, 2023.



Research grants

In 2022, 285 cancer researchers at Karolinska Institutet (KI), including those with clinical affiliation at Karolinska CCC, were awarded SEK 1.5 billion in various grants.

In 2023, the Swedish Cancer Society distributed SEK 949 million to cancer research in Sweden.

Of these grants, 45 percent went to researchers at KI/Karolinska CCC. In total, the Swedish Cancer Society awarded SEK 429 million to 108 researchers from 16 different KI institutions, which is the largest amount that the Cancer Foundation has allocated to KI in one year. The department that received the most grants was the Department of Oncology-Pathology, which received SEK 81 million.

Table 1: Trials open for inclusion per 31 December 2023.

	Theme Cancer	Breast Cancer, Endocrine Tumors and Sarcoma	Pelvic Cancer	CAST	Phase 1-unit	Hema-tology	Head, Neck, Lung and skin Cancer	Radio therapy	Upper abdominal Cancer
Trials started in 2023 (2022: 70)	**58**	6	7	3	8	11	11	2	10
Ongoing trials per 31 December 2023	**429**	48	77	21	39	93	68	6	77
Trials open for inclusion	**190**	17	38	11	19	37	26	4	38
Proportion of academic trials	**64%**	76%	71%	36%	26%	49%	69%	100%	84%

The Swedish Cancer Society's extra investment in Clinical Treatment Studies awarded SEK 120 million to 10 researchers from across the country. 70 percent in total, i.e. SEK 83 million of that investment, was distributed among 6 clinical researchers at KI/Karolinska CCC. Of these, 4 researchers were awarded SEK 15 million each, two of these researchers are from the Department of Molecular Medicine and Surgery, one from the Department of Women's and Children's Health and one from the Department of Medical Epidemiology and Biostatistics. A fifth researcher from KI was awarded SEK 19 million for a Cell Therapy Study at the Department of Medicine in Huddinge.

The Swedish Childhood Cancer Fund awarded SEK 135 million to cancer research in Sweden this year. 38 percent of these grants, SEK 51 million, were awarded to 27 of KI/Karolinska CCC's cancer researchers. 10 researchers from the Department of Women's and Children's Health shared 41 percent of the grants awarded to KI/Karolinska CCC by the Swedish Childhood Cancer Fund, SEK 21 million.

The Swedish Research Council also allocated a large proportion of its Medicine and Health grants to cancer research. They awarded SEK 138 million to 30 cancer researchers.

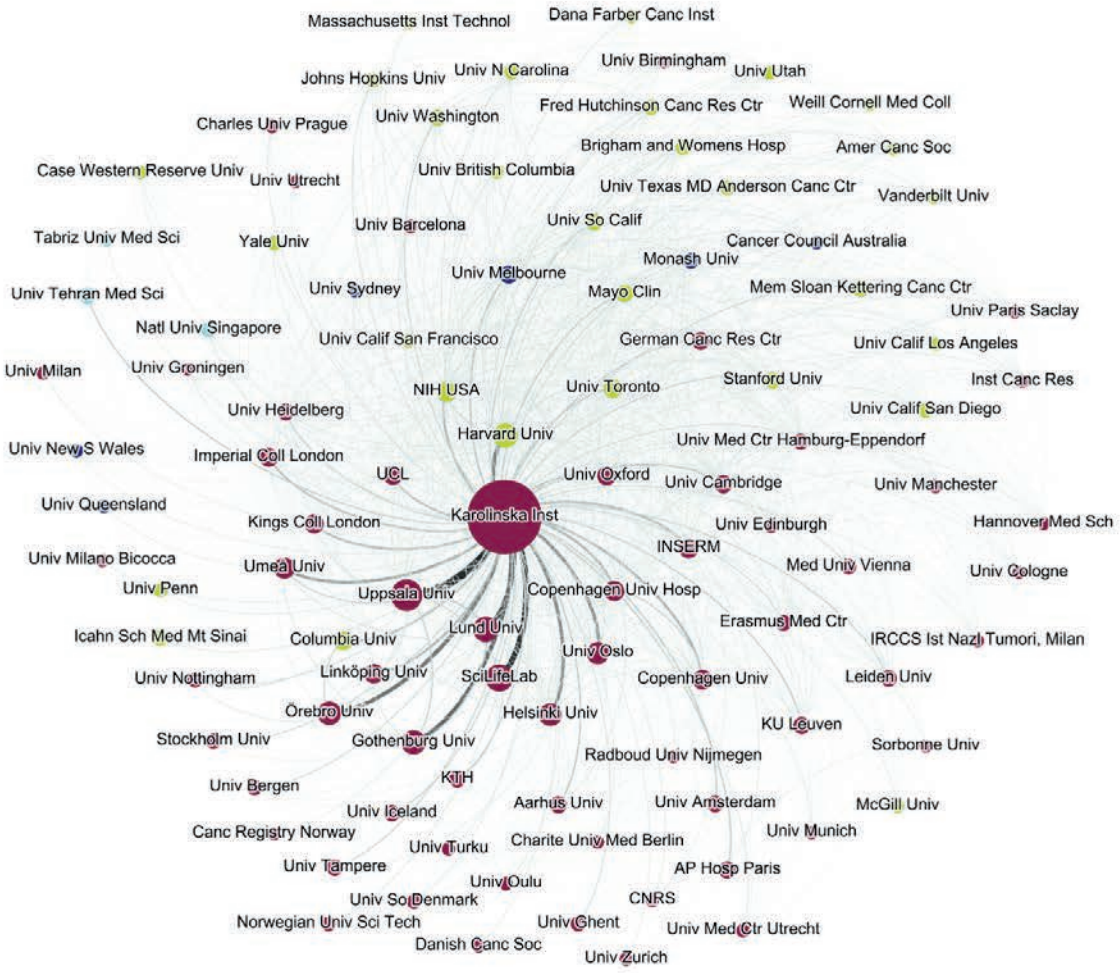
NatiOn – National graduate school in clinical and translational cancer research

From spring 2024, Karolinska Institutet (KI) and Uppsala University (UU) offer a graduate school with a focus on clinical and translational cancer research. The aim is to provide a tailor-made package of courses that form a knowledge base for future clinical researchers within the cancer area. The graduate school mainly covers molecular oncology and research methodology for clinically active people within the cancer area.

The school is designed to provide a solid and advanced base for clinical cancer research. The courses include an in-depth study of basic and new concepts within cancer biology, molecular oncology, research methodology, and tools for clinical cancer research.

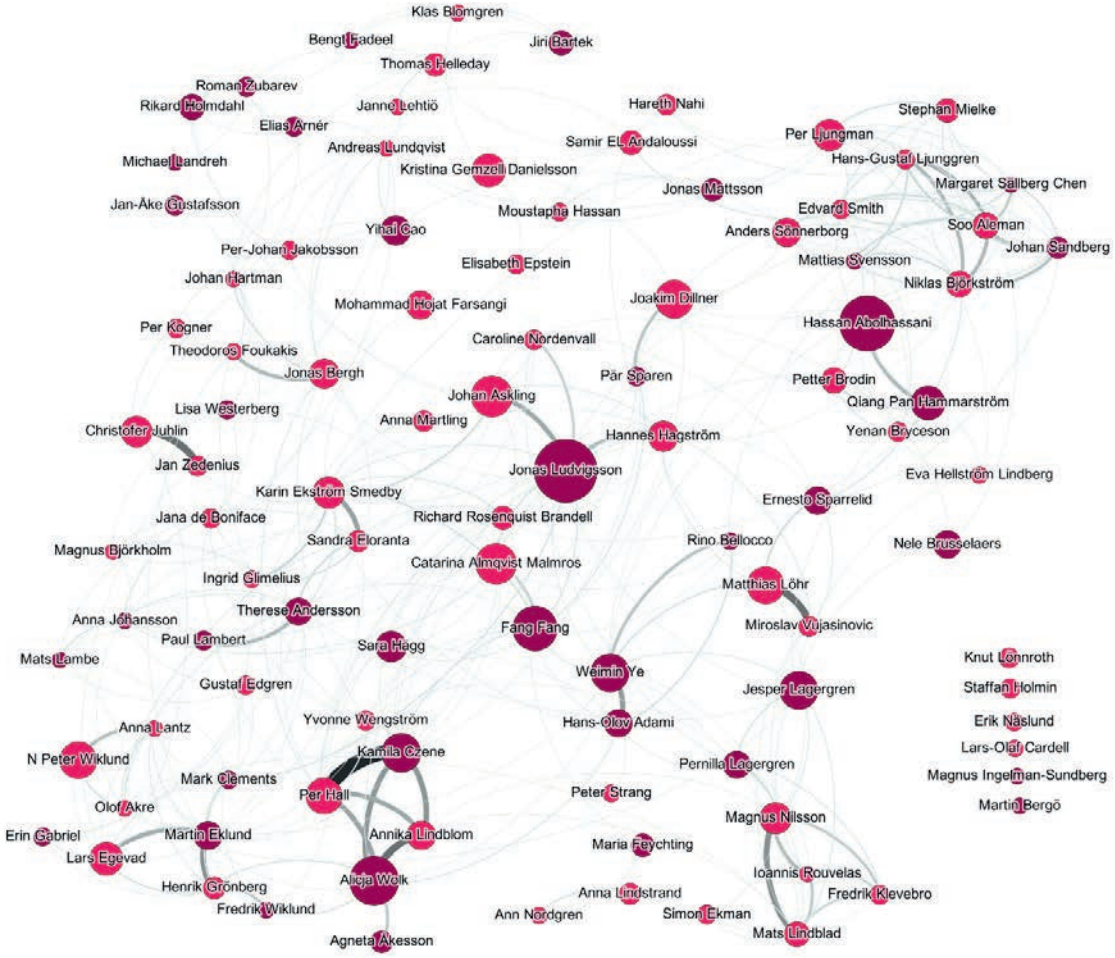
The graduate school is an important part of research education and the proportion of KI-registered students from Theme Cancer has been very high, accounting for between 60–85 percent of the NatiOn students. The disputation rate among PhD students is high, ranging from 87 percent (NatiOn I) to 82 percent (NatiOn IV). The PhD students in later NatiOn rounds (V-VI) have had too short a period of research training and the majority of them are therefore still working on their thesis.

Figure 3: Cancer Research KI and Cancer Theme copublication organisations 2021–2023. 100 organisations have been included (organisations with at least 59 publications). Edges are shown between organisations with at least 14 co-publications.



- Europe
- North America
- Oceania
- Asia

Figure 4: Cancer Research KI and Cancer Theme Author network – at least 22 publications 2021–2023. 101 authors have been included (authors with at least 22 publications). Connections between authors need at least 1 publication to be shown.



Center for Clinical Cancer Studies (CKC)

The Center for Clinical Cancer Studies (CKC) is a medical unit within the Department of Thematic Studies – Cancer and conducts clinical studies on cancer patients.

2023 was an eventful year in clinical studies:

- We have included more patients than ever in our early clinical studies (First in Human and Phase I studies) and we are Sweden's largest Phase I operation within cancer. Inclusion increased by 61 percent compared to 2022.
- We have created the conditions in Solna for conducting studies with new genetically modified organisms/microorganisms (GMOs/GMMs) and the hospital has established a Biosafety Committee in 2023 for advice and coordination on GMOs/GMMs.
- In 2023, we have sent out study information about a sampling study together with the new visit invitation via Alltid Öppet. This has increased inclusion and the plan is now for patients to also be able to register consent via Alltid Öppet.
- We have been actively working on real-time monitoring of patient inclusion in Tableau.
- The Clinical Trials Office (CTO unit) has successfully managed the transfer of almost 60 percent of Theme Cancer's ongoing academic clinical studies to the EU common web portal and database CTIS for studies where Karolinska University Hospital is the sponsor and the CTO has an assignment from the sponsor representative and the researcher.

Figure 5: Number of patients included, 2019–2023. The number of patients included in studies increased by 18 percent compared to 2021.

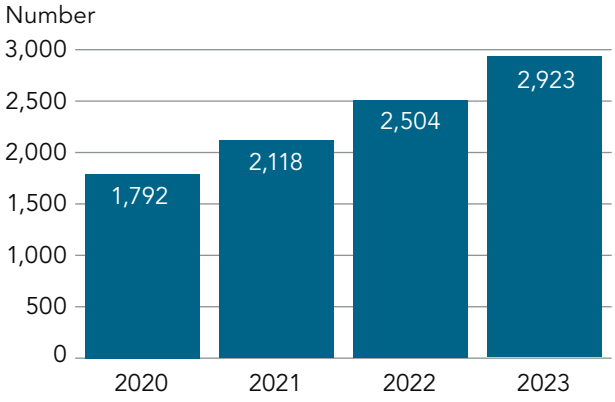


Figure 6: Proportion of newly diagnosed cancer patients included in studies, 2020–2023.

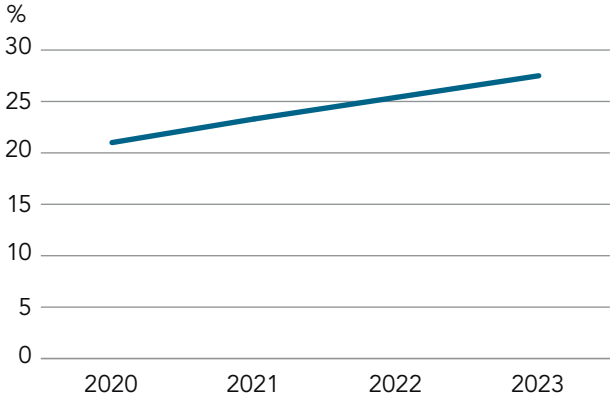
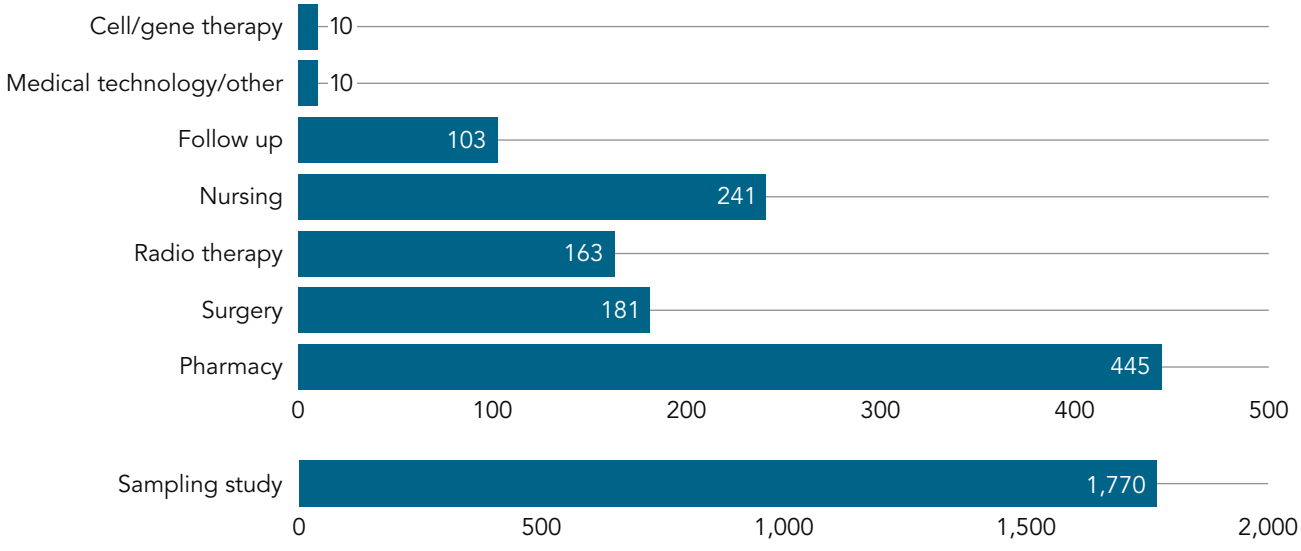


Figure 7: Number of patients included in studies, 2023.



Healthcare production and accessibility – adults

We are one of the largest themes at Karolinska University Hospital with operations in both Huddinge and Solna. We investigate, treat and care for patients with any form of malignant tumor disease. However, we also treat patients without cancer, i.e. benign conditions within areas such as urology, endocrinology, hematology and coagulation.

Standardised care pathways

Data-driven business development enables automatic transfer of lead times and internal monitoring of Standardised Care Pathways (SVF) in real time Standardised Care Pathways (SVF) is a national work practice to reduce unnecessary waiting and uncertainty for patients. Theme Cancer treats patients with many different cancer diagnoses and lead times are reported to the Regional Cancer Centre (RCC) for 30 different care pathways. SVF describes the investigations and initial treatments to be carried out for a given cancer diagnosis, as well as the lead time limits to be aimed for from well-founded suspicion to the start of initial treatment for different diagnoses and treatments.

Structured care documentation enables the automatic transfer of the start and stop of SVF to the SVF-INCA quality register, which was previously recorded manually. This has been implemented across the entire Theme Cancer organisation and included over 7000 patients with a well-founded suspicion in 2023. For official statistics on SVF in cancer care, see cancercentrum.se/samverkan/vara-uppdrag/statistik/svf-statistik.

Internal quality follow-up

Within Theme Cancer, the aim is that data for external reporting can also be followed up and analysed internally for quality follow-up in Karolinska's BI tool. With similar logic as for external reporting, internal follow-up and monitoring of ongoing and completed care pathways in almost real time is made possible. By processing the data internally in Karolinska's Data Warehouse KARDA, events that occur within the time frame of the SVF and are important for the patient's investigation can be analysed with information from several different multidisciplinary source systems, such as the timing of new visits, surgical notification and various radiological examinations. The solution method is relatively generic and applicable to various forms of classifiable processes with a clear start and end for a limited period of time.

In 2022 and 2023, the structured medical records terms have been widely introduced for all care pathways. Several professional categories are involved in the work and therefore everyone becomes part of the SVF work. Previously there was a coordinator who managed the lead times more in-house. But with the mindset of "instead of one person doing everything, everyone does a little bit", most staff have become involved in recording the natural documentation of events in the patient's care.

A follow-up report for managers and coordinators has been developed and is sent out regularly every week.

In 2024, there will be further development of internal follow-up. A new care pathway will be added, additional internal lead times such as from surgery to adjuvant treatment will be added, and the SVF attributes will be transferred to other data sources such as surgery waiting lists etc.

Relative 5-year survival

We have a continued improvement in the 5-year survival rate for cancer patients in the region. In the group of brain tumours reflects the change seen that the criteria for which patients who are registered have been changed and now also include patients who do not receive any treatment are now included. We also also currently offer care to patients with more advanced advanced brain tumours than before.

Figure 8: Proportion of patients within specified lead time, 2023.

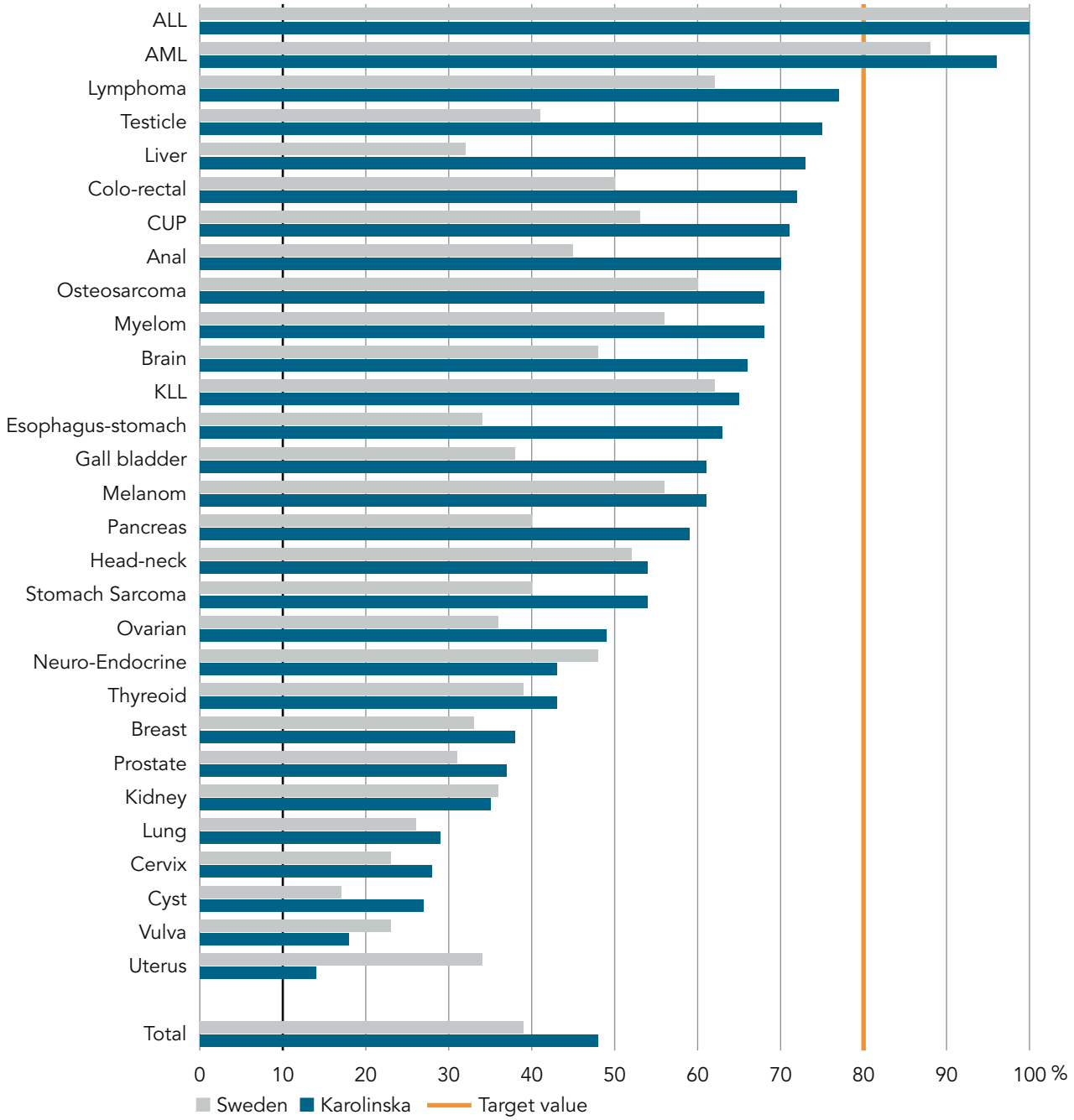
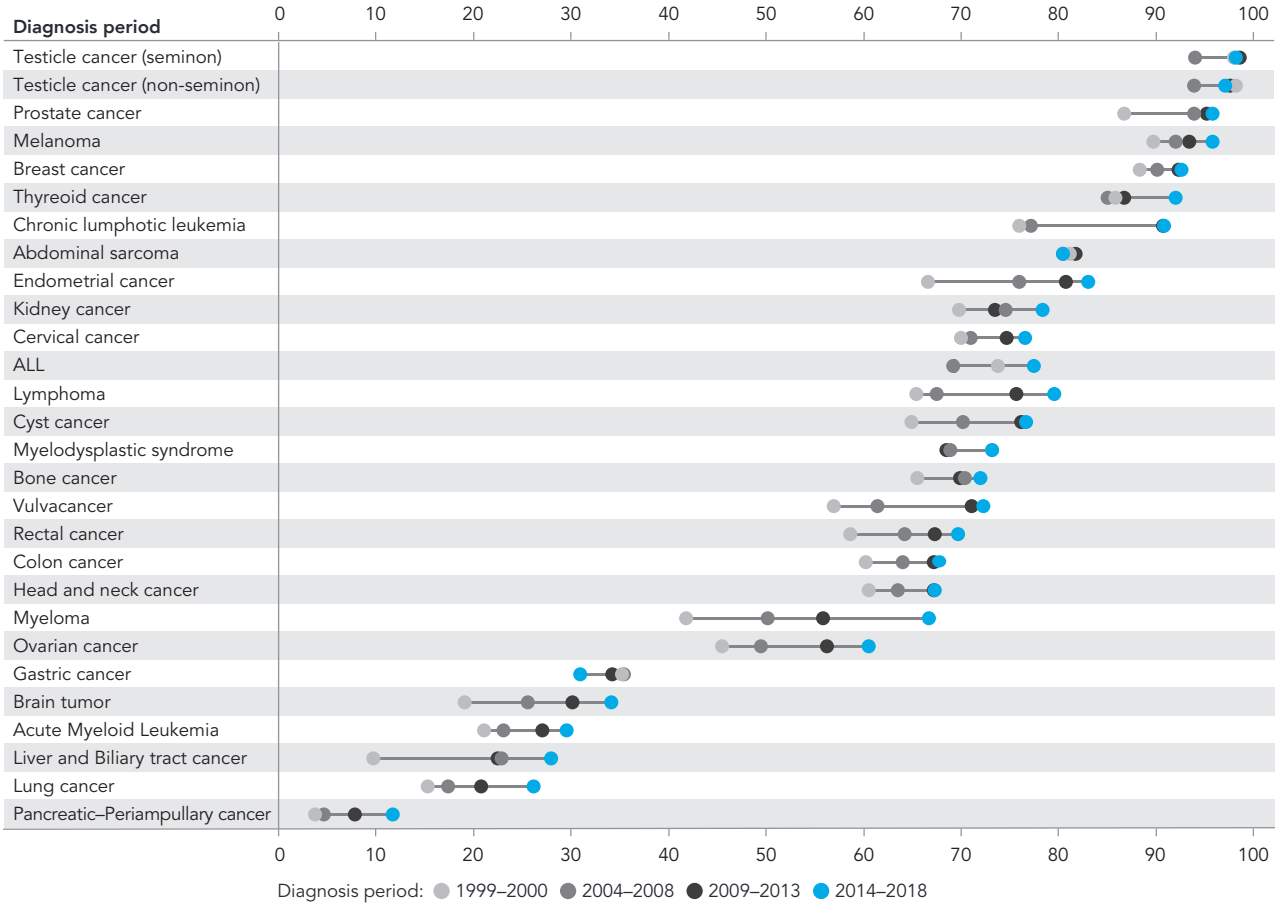


Figure 9: Relative 5-year survival, patients diagnosed (%) in the Stockholm-Gotland healthcare region.



Medical Treatment Department

MBA has continued to further develop the digital work practice to improve accessibility for patients and better resource utilisation. A key part of this is work is the introduction of digital tools and strategies to increase the availability and efficiency of care.

The MBA overview, which is the IT tool used for ordering medicines, has been developed by visualising the symptom control reported by patients in the MBA overview, giving the nurse a better overview of the patient's side effects. The side effects/symptoms that the patient has reported and are abnormal are visualised with red marking for the nurse, making it easier for the nurse to approve the patient's planned treatment.

A balanced care tool has been developed to achieve a more even distribution between nurses and units and to be able to measure over time how it develops in order to dimension the operations.

An important aspect is continuity, as this is important for patients. A patient survey has been completed which showed that the majority of patients consider this important, especially at the beginning of their treatment.

Employees at the MBA have undergone a Health Initiative through the hospital's Healthcare Centre. The 2022 employee survey results showed increased workload with stress and reduced recovery. To prevent ill health, workshops have been held on topics such as sleep, health, job satisfaction, and stress management. The evaluation shows that it was valuable to receive constructive suggestions and solutions and thoughtful reminders about recovery. There is a desire to have recurring themes on stress management and job satisfaction as it is important for the work environment and for the patients.

The MBA has an increasing number of patients year on year. Between 2022 and 2023, the number of unique patients increased from 4740 to 5097, representing an 8 percent increase. The number of treatment visits has increased by 22 percent since 2020. In order to optimise resources and forecast needs based on demographics, an operational review was performed in the autumn. For inspiration, they visited the Antoni van Leeuwenhoek (AVL) hospital in Amsterdam, which is also a comprehensive cancer centre. We conducted the visit together with representatives from Sahlgrenska Comprensive Cancer Centre, as we work together on education and work practices.

Figure 10: Amount waiting for a new appointment (doctor) with a care guarantee.

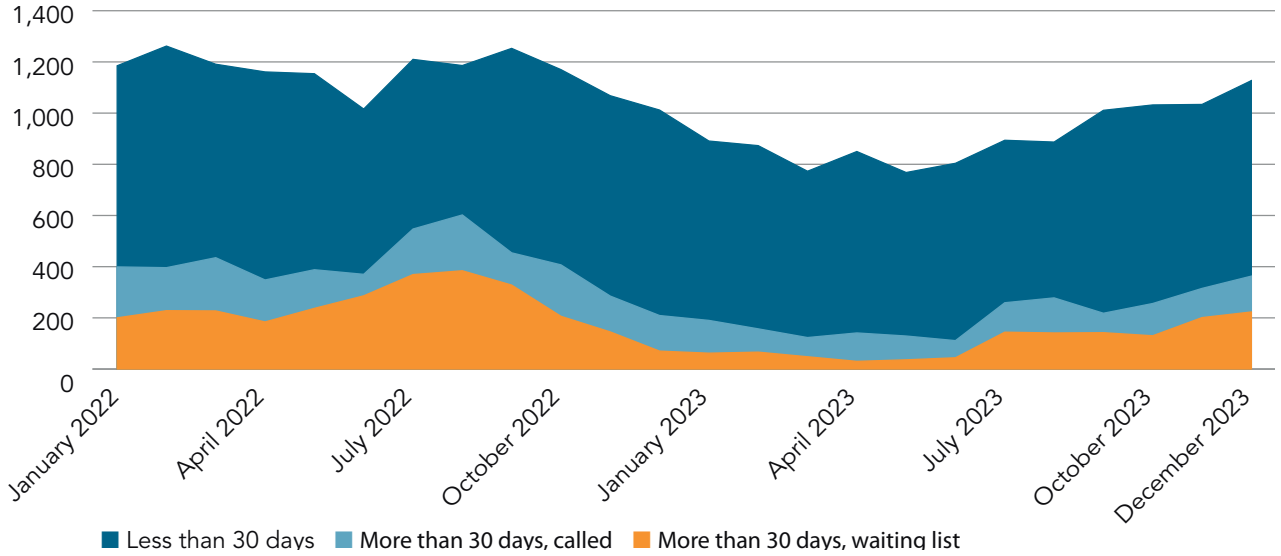


Figure 11: Proportion of total queue waiting <30 days for a new doctor's visit.

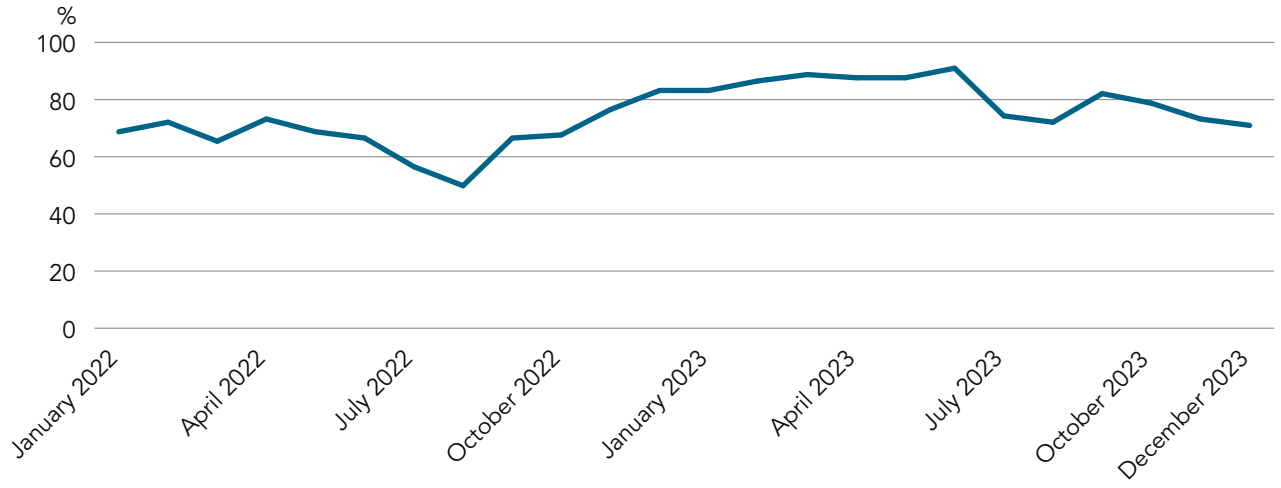


Figure 12: Proportion of patients starting oncological treatment within target, 2018–2023*.

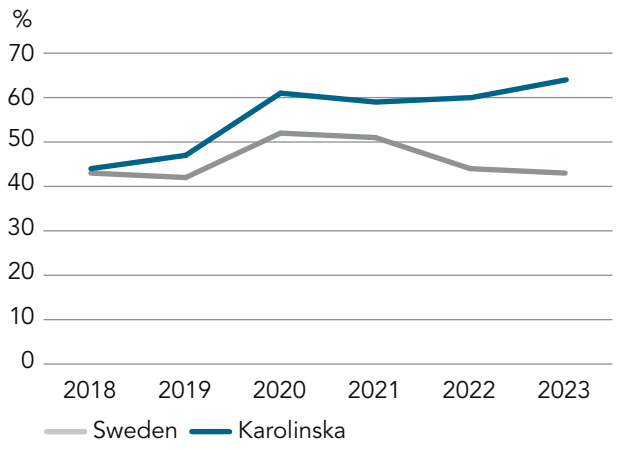
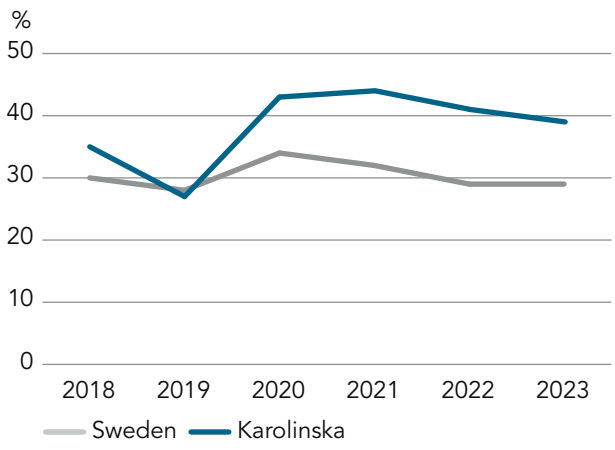


Figure 13: Proportion and number of patients starting radiotherapy within target, 2019–2023*.



* For 2023, the proportion on time is shown from Cancer Theme's internal SVF data that has been implemented successively during the year, hence all data is not complete for all processes.

Medical Unit Radiotherapy

During the year, the medical unit Radiotherapy has initiated a close collaboration with the two other CCCs in Lund and Gothenburg. The main focus has been to work together to find a way to provide and develop skills for nurses and radiology nurses working with radiotherapy.

In order to be able to develop our operations based on patients' wishes, we have set up a PREM council that includes staff from all parts of the medical unit. They review all PREM responses and identify areas for development. One area has been about continuity for patients. To learn more about this, we have conducted our own survey asking patients specific questions about this.

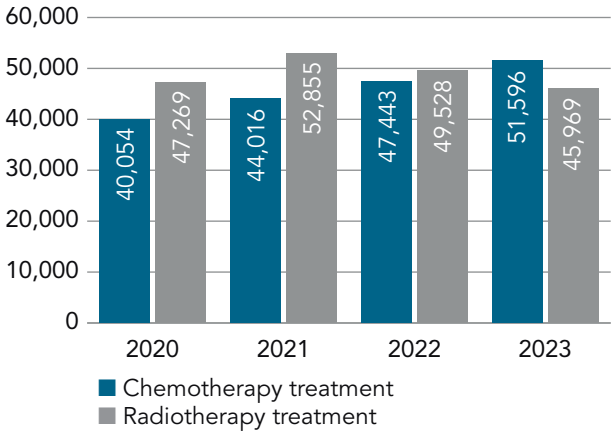
We were able to send several staff members to the ESTRO radiotherapy conference. They had different focus areas during the trip and have shared their knowledge after their return. One focus area was to gather knowledge for future procurement of fixations for SBRT patients.

A delegation of 6 people from the medical unit Radiotherapy travelled to Toronto for a week to visit the radiotherapy clinic at Princess Margaret Hospital and learn about their work with pediatric radiotherapy. Princess Margaret Hospital is internationally renowned for their outstanding work in pediatric radiotherapy. This was made possible as a result of the pediatric cancer initiative. The trip provided several important insights such as reducing the need for anaesthesia, increased continuity and child-friendly information.

We continued the strategic work to introduce MRI-based workflows within radiotherapy, and glioblastoma is now treated in an MRI-only flow.

We have started to introduce AI as an aid to radiotherapy. A first step was to start using the AI-Rad companion for directing to organs at risk in the head and neck region. We are now continuing the implementation for other anatomical areas. The hope is for a full implementation in 2024.

Figure 14: Number of treatments, 2020–2023.



Treatment	2020	2021	2022	2023
Chemotherapy treatment				
Number of unique patients	5,446	5,824	6,254	6,596
Chemotherapy	40,054	44,016	47,443	51,596
Radiotherapy treatment				
Number of unique patients	3,380	3,774	3,933	3,906
Radiotherapy	47,269	52,855	49,528	45,969
Proton therapy	1,788	2,324	—	—

Surgeons visiting newly renovated operating theatres for the first time.

Medical Unit Breast, Endocrine Tumours and Sarcoma

The unit investigates and treats patients with tumors of the breast, endocrine organs, and sarcomas.

Breast cancer

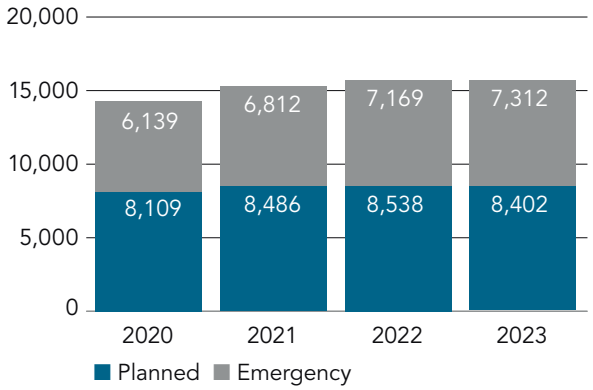
In 2023, recruitment began in Sweden for the ARIADNE study, a Phase IIB randomised international multicentre study of biologic-driven tapering of neoadjuvant therapy for HER2-positive breast cancer. Karolinska CCC is the sponsor of the study, led by Senior Lecturer Foukakis and Senior Lecturer Matikas, Senior Oncologists at the Breast Centre. In addition, two EU-funded studies, CardioCare and REBECCA, have also started their clinical part in 2023, further strengthening international collaborations.

In 2022/2023, the section has introduced a new treatment method for de-escalation of axillary surgery for patients with axillary metastases of breast cancer who, after neoadjuvant treatment, have normalised lymph nodes (targeted axillary dissection, TAD). The method recommended by the national care programme means that patients with a maximum of three lymph node metastases can have limited surgery with removal of the diseased node(s) and the sentinel node instead of having to remove more lymph nodes, which historically has meant a high risk of future arm problems for the patient. A para-magnetic clip is inserted into the affected gland which can then be accurately identified with the Endomag system probe and surgically removed for histopathological analysis. The method has also attracted the attention of the endocrine tumours and sarcomas section, which has begun to use the method in thyroid cancer surgery and when surgically removing complex cases of non-palpable neuroendocrine tumours.

We include patients in a study investigating quality of life in patients with axillary metastases who have undergone neoadjuvant treatment and axillary surgery (AXSANA study).

The indication for genetic testing in newly diagnosed breast cancer has been broadened to include not only heredity of the disease but also other factors such as low age of onset (40 years or less), tumour biology (triple negative breast cancer) and male gender. A panel of 11 breast cancer genes can be analysed on blood samples, and finding a mutation in any of these genes affects both surgical and oncological treatment. Here we have an established collaboration with Hereditary Cancer with a fast track where information on mutations can be analysed and results will be available within three weeks. We are also part of a research project with Hereditary Cancer where women with newly discovered breast cancer can be included in order to learn if a cervical smear can predict breast cancer (the PREP study).

Figure 15: Number of planned and emergency admissions, 2020–2023.



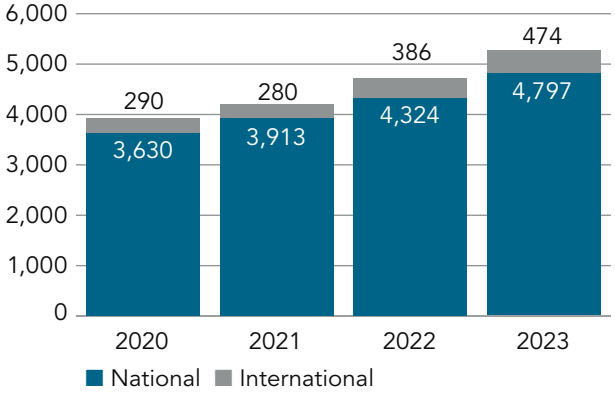
Admissions	2020	2021	2022	2023
Number of admissions	14,248	15,298	15,707	15,714
Proportion of emergency admissions	43%	45%	46%	48%
Admissions with a covid diognosis	548	235	387	241
Number of hospitals beds	185,2	191,2	192	191,2

Hereditary cancer

In 2023, the Hereditary Cancer Section increased collaboration with other sections within Theme Cancer. The collaboration benefits the investigation and treatment of hereditary cancer. A genetic information and blood test for rapid gene panel is needed for treatment decisions, often within 3 weeks. For several years, this collaboration has been working well for breast cancer. The section for hereditary cancer is now introducing a fast track for a gene panel in colorectal cancer, initially starting in the colorectal section. The need for treatment prediction will increase for several tumour groups. The Hereditary Cancer Section is very active in the European reference network ERN-GENTURIS, for rare tumour risk syndromes.

We conduct research aimed at the early detection and prevention of breast and ovarian cancer and have also become one of 20 enrolling centres in the TUBA-WISP II study (PI Angelique Flöter Rådestad). An international prospective multicentre study in which women with hereditary increased risk of ovarian cancer choose whether to undergo risk-reducing surgery in 2 stages, first by removing the fallopian tubes with delayed removal of the ovaries closer to the natural age of menopause or in one stage with simultaneous surgery of the fallopian tubes and ovaries. The rationale is that ovarian cancer starts in the distal part of the fallopian tube and that there are published data indicating that 2-stage surgery provides a better quality of life. TUBA WISP II studies the oncological safety of the different surgical methods.

Figure 16: Number of national and international patients, 2020–2023.



National and international patients	2020	2021	2022	2023
Number of outpatients visits	11,840	13,182	15,133	18,324
Number of admissions	882	1,047	1,133	1,264
Multidisciplinary meetings	2,482	2,505	2,815	3,497
Number of new visits, physician	617	640	936	1,054

Endocrine tumours, sarcomas

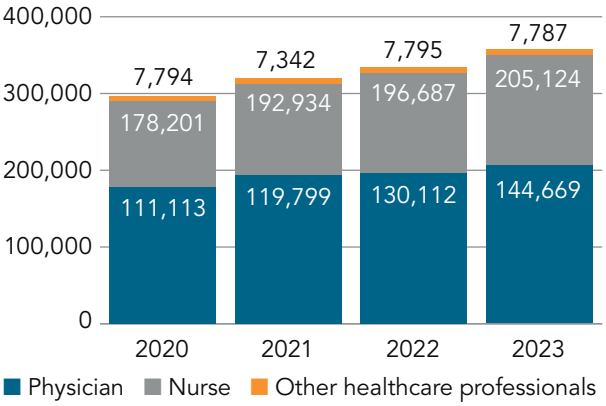
Together with Skåne, Gothenburg and Uppsala, we were assigned the task of national highly specialised care (NHV) for advanced neuroendocrine tumours (NET) and advanced adrenal tumours. The task was launched on April 1, 2023, and involves referring advanced NETs, all pancreatic NETs and inoperable rectal NETs to one of these units, as well as adrenal tumours larger than 6 cm or showing signs of malignancy at diagnosis.

These four centres therefore launched a national multidisciplinary conference during the year to allow for a broadened discussion of patients with these rare and sometimes difficult-to-treat conditions. In addition to the clinical mission, there is also an research, development and training mission for these diagnoses. Thus, Karolinska has joined a multicentre study for the treatment of progressive NET. The study randomises patients to different treatment strategies with so-called PRRTs, i.e. Lutetium-labelled peptides that target somatostatin receptors on the surface of tumours. The study was

initiated in 2023 and its goal is to see if individualised PRRT treatment with an adapted dose provides better progression-free survival than the current standard treatment with 4 fixed doses.

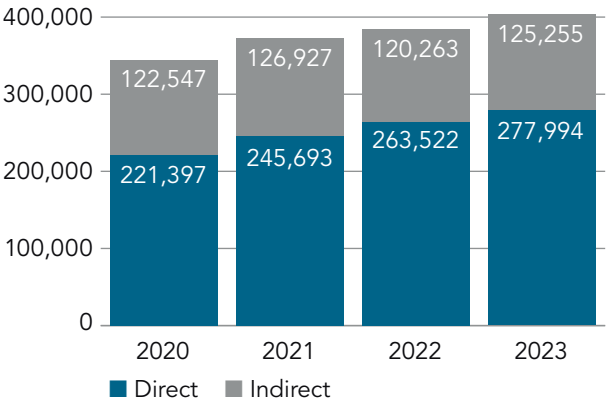
A project on antibody-mediated molecular radiotherapy, where Lutetium is linked to an antibody targeting the CD44v6 epitope, which is expressed in several highly malignant tumours, has taken shape during the year in collaboration with the Institute of Genetics and Pathology in Uppsala (Marika Nestor). Nestor's basic science findings are so promising that we can now aim after bringing this new and unique treatment to patients for the first time. Initially, patients with anaplastic metastatic thyroid cancer, or patients with differentiated but radioiodine-refractory metastatic thyroid cancer are treated. Several of the section's physicians run their own projects in the field of endocrine tumours, ranging from epidemiological studies of treatment for hyperparathyroidism, studies of cognitive impact after thyroid cancer diagnosis and treatment, to translational projects in thyroid cancer in particular. The aim of the latter studies is to better assess the highly variable prognosis of thyroid cancer patients, and thus increasingly adapt treatment and follow-up.

Figure 17: Outpatient contacts per category of healthcare provider excluding radiotherapies, 2020–2023.



Outpatient care by healthcare provider	2020	2021	2022	2023
Physician	178,201	192,934	196,687	205,124
Nurse	111,113	119,799	130,112	144,669
Other healthcare professionals	7,794	7,342	7,795	7,787
Total number of outpatient contacts all health care providers	297,108	320,075	334,594	357,580

Figure 18: Number of direct and indirect visits, 2020–2023.



Outpatient	2020	2021	2022	2023
Proportion of indirect visits	36%	34%	31%	31%
Number of unique patients	59,431	62,597	65,558	68,532
Number of new visits	16,709	18,252	19,659	20,538
Number of unique patients and new visits	8,524	9,091	9,844	10,615

Medical Unit Pelvic Cancer

The unit investigates and treats malignant diseases urinary tract, male and female genitals, and intestine. Benign urological diseases are also treated and inflammatory bowel disease (IBD).

Gynaecological Oncology

In 2023, the Section of Gynaecological Oncology was the first in Sweden to prospectively offer women undergoing surgery for uterine cancer a genetic molecular characterisation within the framework of the study "Implementation of Molecular diagnosis of Endometrial cancer" (IMolE). The study is a preparation for the implementation of personalised cancer medicine in the clinic for Sweden's most common type of gynaecological cancer, a project supported financially by RCC Stockholm (PI Emelie Wallin). The testing identifies prognostic groups within uterine cancer, which may guide the choice of treatment for the patient in both primary treatment and relapse. The hope is that with unique molecular imprints, we will be able to tailor the patient's treatment. The Precision Medicine Centre Karolinska (PMCK) has been central to planning, logistics and biobank management. In accordance with Karolinska CCC guidelines, the study includes not only a clinical research part but also a translational part that includes studies on the tumour microenvironment at KI (PI Hanna Dahlstrand).

Other news that strengthens gynaecological oncology in leading development and research within the field is that the group has received grant for a postdoc Emelie Wallin and that Hanna Dahlstrand has been appointed Senior Physician at Karolinska University and Research Team Leader at KI.

We continue to strengthen the development around the rare gynaecological tumours. Since earlier, the Section of Gynaecological Oncology runs the NHV (national highly specialised care) mission for gestational trophoblastic disease as well as an active membership in the European reference network EURACAN (European Network for Rare Adult Solid Cancer). In 2023, our membership in EURACAN was renewed. In 2023 Ulrika Joneborg assumed the role of President of the European Organisation for Treatment of Trophoblastic Diseases (EOTTD).

To strengthen our role as a leader in rare gynaecological tumours, we are expanding our national MDK, which now includes both trophoblast tumours and rare ovarian cancer, giving all women in Sweden with a rare form of gynaecological cancer access to the best possible expertise from across the country.

Colorectal surgery sectioni

The colorectal section aims to achieve a world-leading position in clinical practice and integrated research by 2025. This is in competition with established global centres such as the Mayo Clinic, USA, the Cleveland Clinic, USA and St. Mark's hospital, England.

By completing several processes initiated in the autumn of 2022, one of the main goals of which has already been achieved by becoming a so-called national highly specialised centre for advanced pelvic surgery. The contract starts on July 1, 2024 and we are well prepared for this. We already have a National Highly Specialised Care (NHV) mandate for HIPEC treatment, the so-called cytoreductive surgery combined with hot chemotherapy in the peritoneal cavity (CRS/HIPEC), which is used to treat patients with metastatic cancer of the peritoneum.

Another key objective is to develop the possibility of organ preservation treatment in colorectal cancer. Traditionally, colorectal cancer has mainly been treated with major abdominal surgery with a high risk of complications. However, this has changed over time to the widespread use of various minimally invasive treatment methods.

Two surgeons performing a seance operation, which means that several different procedures are performed in different stages.

Thanks to precision medicine, which aims to provide patients with a more tailored treatment based, for example, on specific genetic factors, the possibility of curative treatment has progressed further. With the help of targeted treatment, cancers that used to require surgery can disappear completely or partially without major surgery. In cases where medication has only a slowing effect, treatment can be complemented by new ways of using radiotherapy, known as brachytherapy, or new surgical methods that only remove the tumour locally, ESD (endomucosal endoscopic resection) or robot-assisted transanal minimally invasive surgery.

The section introduced organ-preserving treatment for rectal cancer (so-called Watch &Wait) as the first centre in Sweden already in 2015 and has a well-established platform for this in the absolute front line. Furthermore, our research unit has for several years built up a large capacity for the development and implementation of precision medicine with several especially interesting ongoing projects. New precision radiation equipment has recently been acquired and we plan to open a unit for ESD and robot-assisted transanal surgery shortly.

Publication: Incidence and risk factors for venous thromboembolism after laparoscopic surgery for colorectal cancer. pubmed.ncbi.nlm.nih.gov/25216684

Urology Section

The Urology Section in Solna is conducting the PRIS (Prostate Cancer IRE Study), which evaluates a new technique for treating localised prostate cancer, where only the tumour in the prostate is treated and not the entire gland, as in surgery. By treating only the tumour inside the prostate, the idea is to minimise the impact on the rectum, urinary tract and erectile nerves and thus the risk of side effects. During the year, 18 men were included in the study. The focal treatments were performed using irreversible electroporation and the results so far have shown a low rate of side effects and good treatment results on follow-up MRI scans for the men who underwent the treatment. Professor Olof Akre has been awarded a research grant of SEK 15 million for the SPCG-15 study, which randomises men with locally advanced prostate cancer to either surgery or radiotherapy.

Publication: Risk of Postoperative Ischemic Stroke and Myocardial Infarction in Patients Operated for Cancer. pubmed.ncbi.nlm.nih.gov/38091152

Medical Unit Upper Abdomen

The unit is responsible for investigation, care and treatment of patients with malignant and highly specialized benign diseases of the oesophagus/stomach, liver and pancreas.

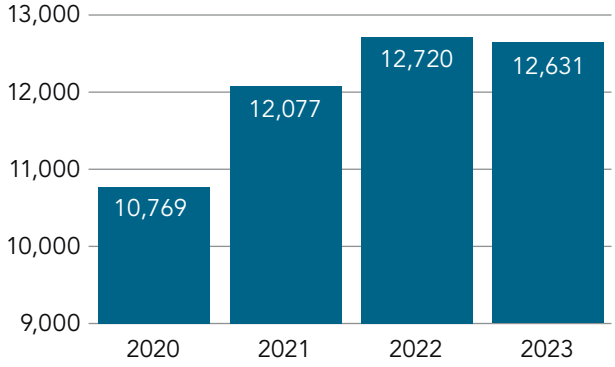
In 2023, we have managed to deliver cancer care with short waiting times in all our patient flows while we have had resources to receive more patients for cancer surgery from other regions in the country than ever before. Notable clinical advances include national highly specialised care (NHV) assignments in primary sclerosing cholangitis assigned to the upper abdomen, new internal radiotherapy for liver tumours (SIRT) introduced, and the continued implementation of minimally invasive robot-assisted surgery.

Research has been the focus of the year, with an increasing number of projects and studies aimed at understanding disease mechanisms, developing new treatment methods and improving diagnosis. Since 2023, the Upper Abdominal research unit is part of the Centre for Clinical Cancer Studies, which we hope will provide higher quality and increased research activity.

Several large grants from both public and private organisations have been instrumental in supporting these research efforts. By providing financial resources, researchers have been able to conduct their projects and drive innovation within the field. Other events worth reporting are that Professor Mattias Löhr has been appointed President of the United European Gastroenterology (UEG), and that Professor Magnus Nilsson has completed a multicentre randomised study on surgical treatment of oesophageal cancer that has received considerable international attention.

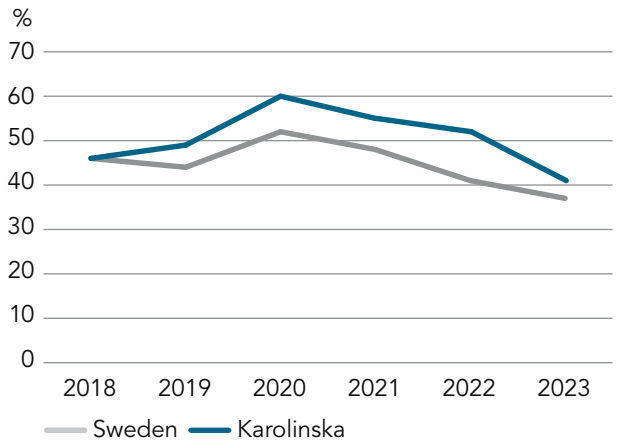
At the same time, it has been a year of intensive efforts to improve regional and national cancer care. By implementing new guidelines and protocols, we have been able to offer patients a high standard of care and treatment. The combined efforts of researchers, healthcare professionals, government and society as a whole have enabled real progress to be made in the fight against cancer over the past year. With continued commitment and collaboration, we look forward to building on these successes and providing better care and quality of life for patients affected by this serious disease.

Figure 19: Number of surgical interventions, 2020–2023.



Surgery	2020	2021	2022	2023
Number of surgical interventions	10,769	12,077	12,720	12,631
Outpatient surgery	3,353	3,709	3,983	4,202
Robot-assisted surgery	940	1,114	1,249	1,397

Figure 20: Proportion and number of patients starting surgical treatment within target, 2018–2023*.



* For 2023, the proportion on time is shown from Cancer Theme's internal SVF data that has been implemented successively during the year, hence all data is not complete for all processes.

Medical Unit Head-, Neck-, Lung- and Skin cancer

The unit investigates and treats patients with ear, nose and throat cancer, lung cancer, skin tumors inclusive malignant melanoma and patients with unknown primary tumor.

PLUS pilot study for lung cancer screening

On behalf of Region Stockholm, a research study for lung cancer screening in Stockholm is ongoing. The study, which is the first in the country, is being conducted by the Regional Cancer Centre (RCC) Stockholm/Gotland in collaboration with X-ray and Pulmonary Oncology Centre (LOC) Karolinska University Hospital, Solna.

Gunnar Wagenius, docent, responsible for the lung cancer screening study.

Large international studies have shown that lung cancer screening targeted at a high-risk population of smokers and ex-smokers allows lung cancer to be found at an early stage of the disease and lung cancer screening can thereby save lives. The aim of the current study is therefore not to demonstrate the benefits of lung cancer screening, as this has already been shown, but to investigate whether targeted screening of smokers/ex-smokers is a feasible and cost-effective way of detecting lung cancer at an early stage and whether it is feasible in practice.

The results of the study are also intended to serve as a knowledge base for planned similar regional screening projects in the country, as well as providing a basis for the National Board of Health and Welfare for a decision on the possible national introduction of lung cancer screening. The study is conducted in accordance with EU recommendations.

The research study involves women aged 55–74 with an increased risk of lung cancer. The study focuses on both secondary prevention through pulmonary X-ray examinations and low-dose computed tomography lung scans and primary prevention by offering support to stop smoking through the Stop Smoking Line.

After extensive research and planning, the study started on September 1, 2023, when the first questionnaires were sent out. If you meet the study criteria for smoking habits, you will be offered an appointment for an X-ray examination and a low-dose CT scan. By spring 2024, the study's planned 1000 X-ray examinations will have been completed. During the course of the study, we have found several individuals with lung changes and they will be followed up. We have also found eight individuals with early lung cancer who have undergone or are about to undergo surgery. These eight individuals had no symptoms and, without the current pilot study, would probably only have come into contact with the healthcare system at a later stage when the disease would have progressed.

As the chosen method, results and work practice work well, Region Stockholm and RCC are keen to continue and expand the study. The study will therefore be expanded with an additional 1000 surveys by inviting more women and also including men, and supplementing with sampling of selected biomarkers. The study has strong support in the region and is part of the politically agreed cancer plan for 2024–2027.

Collaboration with Cancer Core Europe

Cancer Core Europe (CCE) is an established consortium of 8 European Comprehensive Cancer Centres, which since 2014 aims to develop research infrastructure through pre-clinical, translational and clinical research.

Figure 21: Members of Cancer Core Europe.

In 2023, we have continued to expand our collaboration within the CCE to implement precision medicine developments. Within the Basket of Basket study, which is a multi-module genomic driven phase II study of solid tumours, we have opened another treatment module (Module 3) and globally screened >1000 patients. This has led to further development of the Molecular Tumour Board Portal, which is the IT environment for interpreting the pathogenicity (the ability of a microorganism to cause disease) and treatability of genomic variants, in relation to inclusion in clinical studies. Luigi De Petris, Senior Physician, is in charge of the study.

To facilitate collaboration with different pharmaceutical companies, and to become more attractive for bringing clinical studies to CCE centres, the consortium has also created an international Phase I group and an academic CRO to harmonise the regulatory framework, such as contracts, common budget, and established material and data transfer agreement.

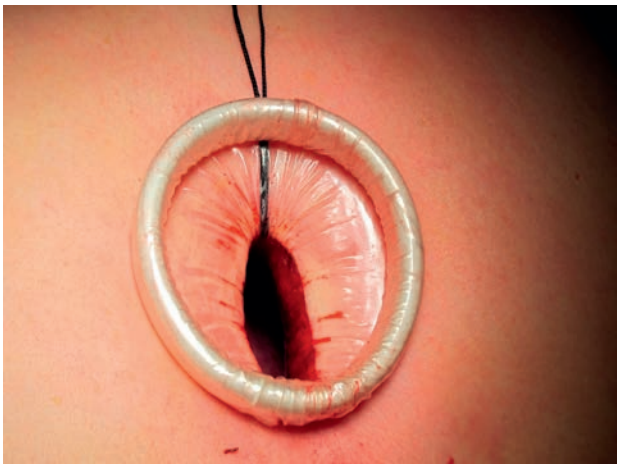
Lung cancer surgery

In 2023, 94 percent of lung cancer patients underwent surgery with Uniport VATS technology. It was also in 2023 that we performed surgery on 270 individuals – the highest number of lung cancer patients ever in Stockholm.

Uniport VATS subxiphoid thymectomy was developed in the last 3 years with very short hospitalisation time and minimal complications. In 2023 around 20 individuals had surgery performed with this technique. We have implemented a so-called "Fast track" for all patients where they arrive on the morning of surgery and 50 percent are discharged already the following day, which is feasible thanks to a close collaboration with the surgeons and nursing staff in our Lung and Head-Neck-Surgery Department within Theme Cancer.

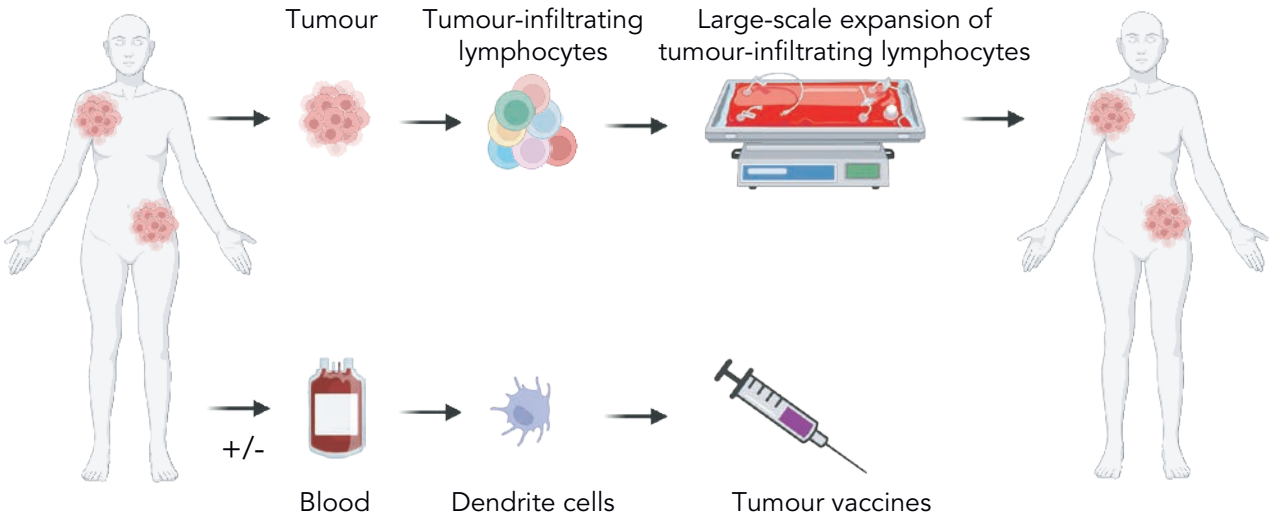
Hospitalisation time continues to be the lowest in the country compared to other clinics. We also observe less morbidity and very low mortality. Waiting times and the number of surgeries within 3 weeks have decreased in recent years for all patient categories and especially for lung cancer patients according to the ThoR registry for thoracic surgery, says Mamdoh Al-Ameri, Senior Consultant/Medical Doctor working in the Lung Oncology Centre.

Uniport intervention in lung cancer surgery.



Uniport intervention in lung cancer surgery.

Figure 22: The top row represents TIL production which is combined with a tumour vaccine (bottom row).



GMP – Cancer Centre Karolinska
With a focus on clinical studies in cell therapy, GMP-CCK manufactures advanced therapy medicinal products (ATMP) for the treatment of patients with solid tumours and focuses its manufacturing on cell therapy products and in particular on cancer vaccines and tumour-infiltrating lymphocytes. GMP-CCK is supported by funding mainly from the CCK Foundation and the Cancer Research Funds of Radiumhemmet.

Rolf Kiessling is head of operations at GMP-CCK and sponsor of Sweden's first clinical study where patients with melanoma are treated with a combination of tumour-infiltrating lymphocytes and cancer vaccine. The treatment shows clear clinical results with 3/4 of the patients being long term survivors (>5 years) (Maria Wolodarski is PI; clinical lead). In 2024, GMP-CCK plans to produce tumour-infiltrating lymphocytes for two additional academic studies. One is a study in patients with cervical cancer, which is the first clinical study of its kind in Sweden. The study is funded by Innovation Fund Denmark and is a collaboration between Stina Wickström (sponsor), Emelie Wallin (PI) and Rolf Kiessling at Karolinska Institutet and Karolinska University Hospital and Cbio A/S.

In an EU-funded project, researchers at Karolinska Institutet (including Rolf Kiessling, Andreas Lundqvist and Stina Wickström) are collaborating with five university hospitals in Europe to improve the clinical outcome of treatment with tumour-infiltrating lymphocytes. At Karolinska University Hospital, the patients are planned to be treated at medical unit CAST in close collaboration with Stephan Mielke and his team, who are also co-applicants for the EU grant.

Our hope is that knowledge from these clinical studies will result in improved production and implementation of tumour-infiltrating lymphocytes in the healthcare system, leading to more patients being successfully treated.

Publication: Cancer Prevention Literacy among Different Population Subgroups: Challenges and Enabling Factors for Adopting and Complying with Cancer Prevention Recommendations. pubmed.ncbi.nlm.nih.gov/7239613

Publication: Radiotherapy with or without immunotherapy in metastatic melanoma: efficacy and tolerability. pubmed.ncbi.nlm.nih.gov/37966921

Publication: Prognostic implications of p16 and HPV discordance in oropharyngeal cancer (HNCIG-EPIC-OPC): a multicentre, multinational, individual patient data analysis. pubmed.ncbi.nlm.nih.gov/36796393

Publication: Expanded HILUS Trial: A Pooled Analysis of Risk Factors for Toxicity From Stereotactic Body Radiation Therapy of Central and Ultracentral Lung Tumors. pubmed.ncbi.nlm.nih.gov/37423292

Publication: Cerebrospinal fluid as a liquid biopsy for molecular characterization of brain metastasis in patients with non-small cell lung cancer. pubmed.ncbi.nlm.nih.gov/37423059

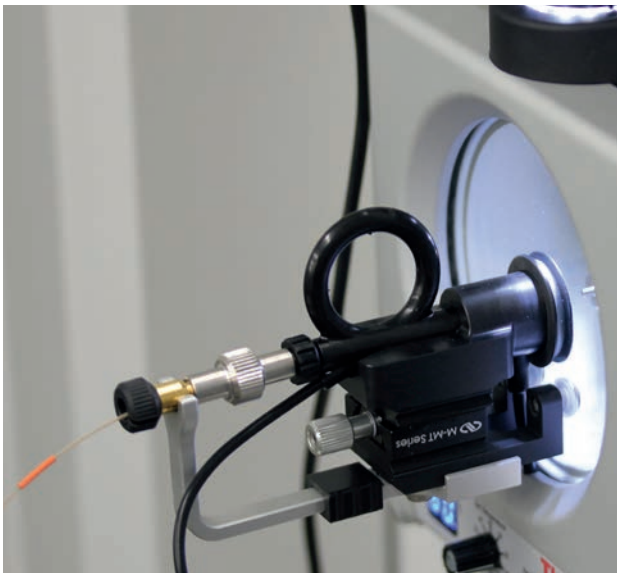
Medical Unit Hematology

The unit is the largest hematology clinic in the Nordic countries and receives patients with all forms of blood cancer and non-malignant hematological diseases from the Stockholm region.

The unit is the largest hematology clinic in the Nordic countries and receives patients with all forms of blood cancer and non-malignant hematological diseases from the Stockholm region. The Unit has been very active in research with 31 studies open for inclusion in 2023, of which 25 have been treatment studies and 6 sampling or other studies. Of the treatment studies, 9 have been phase 1 studies. Furthermore, we have fully implemented Team-based learning (TBL) in the Medical School curriculum with very good results in course evaluation. The Young Researchers in Hematology conference, a full-day conference in Solna in October focusing on presentations and networking by and with younger researchers within and related to hematology, was a great success.

The Centre of Excellence Systemic Mastocytosis has used plasma proteomics screening to find new diagnostic and prognostic markers for systemic mastocytosis, and found CCL23 as a potential new biomarker. We also show that CCL23 is specifically produced from mutated diseased mast cells in systemic mastocytosis. The publication is below and we are now proceeding with a larger independent validation cohort and hope to introduce into the clinic within a year or so.

Publication: Proteomic and transcriptomic screening demonstrates increased mast cell-derived CCL23 in systemic mastocytosis. pubmed.ncbi.nlm.nih.gov/36813186



Coagulation Section

The Coagulation Section is working on several updated guidelines for conditions with increased bleeding risk in, for example, obstetrics, joint Nordic guidelines for von Willebrand, guidelines for bleeding investigations and local guidelines for hemophilia. Medication adjustments are a constant work in progress. The majority of children with severe hemophilia A have been able to switch to emicizumab (Hemlibra®) and for adults, high priority hemophilia patients have been able to switch to emicizumab in line with national guidelines.

Gene therapy medicines have been approved by the EMA for hemophilia A and B. NT recommendations are expected in spring 2024. Karolinska, in collaboration with Nordic hemophilia colleagues, has created uniform guidelines for the treatments. In 2024, coagulation will become national highly specialised care.

Publication: Infrastructural considerations of implementing gene therapy for hemophilia in the Nordic context. pubmed.ncbi.nlm.nih.gov/37859645

Chronic lymphocytic leukaemia (CLL)

Our own translational studies and networks in CLL have resulted in several publications where the unit has had a national coordinator role in phase 3 studies, where, for example, the study zanubrutinib vs ibrutinib in advanced CLL (NEJM 2023) advanced both safety and efficacy in precision treatment of CLL. The KLL group from KI (Anders Österborg, Jeanette Lundin, Lotta Hansson, Marzia Palma, Hanna M. Ingelman-Sundberg) has grants from the Swedish Cancer Society, the Cancer Research Funds of Radiumhemmet, the Blood Cancer Fund, the Cancer and Allergy Fund and the Felix Mindus Research Funds.

Lymphoma

A large observational multicentre study with significant contributions from Karolinska on CNS prophylaxis in diffuse large B-cell lymphomas, this work has already had a major impact on our national care program in aggressive B-cell lymphomas in terms of guidelines for CNS prophylaxis (see publication below). Grants have also been awarded to KI Researchers Karin E Smedby from the Swedish Cancer Society and Tove Wästerlid from the Åke Olsson Foundation.

Publication: High-Dose Methotrexate as CNS Prophylaxis in High-Risk Aggressive B-Cell Lymphoma. pubmed.ncbi.nlm.nih.gov/37797284

Myeloid malignancies

KI Researchers from the unit shows in retrospective studies by screening for stem cell mutations in bone marrow samples from patients with Myelodysplastic Syndrome (MDS) who underwent allogeneic stem cell transplantation, that bone marrow which after transplantation showed remission but later went into relapse, Measurable Residual Disease (MRD) could be detected in some cases more than 2 years before the clinical relapse occurred. The results of a Nordic prospective multicentre study led by Karolinska University Hospital show that analysis of minimal residual disease by personalised markers is a very strong predictor of relapse and survival in patients with MDS undergoing allogeneic stem cell transplantation. These findings may have important implications for MRD screening after stem cell transplantation and interventional treatment to prevent relapse in positive MRD.

Publication: Identification and surveillance of rare relapse-initiating stem cells during complete remission post-transplantation. pubmed.ncbi.nlm.nih.gov/38096358

Publication: Patient-Specific Measurable Residual Disease Markers Predict Outcome in Patients With Myelodysplastic Syndrome and Related Diseases After Hematopoietic Stem-Cell Transplantation. pubmed.ncbi.nlm.nih.gov/38232336

In other studies, our researchers are in collaboration with researchers at the University of Oslo show that specific T cell receptors (TCRs) against a recurrent point mutation (in FLT3) in AML can effectively eliminate leukemia cells, including leukemia stem cells in mice that develop AML after being transplanted with AML cells from patients. As a result of these findings, clinical studies with these TCRs are planned.

Publication: A T-cell receptor targeting a recurrent driver mutation in FLT3 mediates elimination of primary human acute myeloid leukemia in vivo. pubmed.ncbi.nlm.nih.gov/37783807

Publication: Erythroid differentiation intensifies RNA mis-splicing in SF3B1-mutant myelodysplastic syndromes with ring sideroblasts. pubmed.ncbi.nlm.nih.gov/37921711

For 2024, we will continue to develop precision medicine within the lymphoma section and move from study to clinical implementation. This concerns both the development of sequencing panels on tumor material and the measurement of cell-free tumor DNA in plasma. Development of precision medicine in the myeloma section is also taking place through a study started together with KI with a sequencing panel on bone marrow material. The creation of the Centre of Excellence for systemic mastocytosis and the validation study of the CCL23 new biomarker described above, as well as its implementation into clinical practice, are also important steps forward.

Pediatric Oncology and Hematology

In 2023, initiatives have been taken to include Pediatric Oncology Hematology (Karolinska University Hospital) in Karolinska CCC. As a result, the organisation has conducted a self-assessment against OECI quality standards and is now fully participating in the re-accreditation process.

Precision medicine for patients with pediatric cancer – from study to implementation

Karolinska University Hospital has been an active participant in the national GMS Pediatric Cancer study since 2020 and has also been responsible for coordinating sample collection and interpretation of patient samples from Linköping, Uppsala and Umeå. The study has now published results and experiences during the autumn and also produced the beginnings of a health economics analysis. The results of the study support the implementation of whole genome sequencing as part of routine diagnostics. The national specialist section of Pediatric Hematology and Oncology (PHO) now recommends implementation of whole genome sequencing for all children diagnosed with cancer.

The implementation process has started in a collaboration between the laboratories and pediatric oncologists by the end of 2023. Work is required to clarify sample flows, result turnaround, result routines and a well-functioning multidisciplinary round and it is hoped that it will be ready during 2024 Q2–3.

Development and Innovation in Pediatric Cancer

Part of the development work in pediatric cancer care in Stockholm Gotland in 2023 has been financed by the government's pediatric cancer initiative. The pediatric cancer initiative enables and engages staff and managers to streamline internal processes and improve care. Some examples are described here:

Regional Rehab Function within Pediatric Cancer

It has been identified within the Astrid Lindgren Children's Hospital as a gap for children with high needs for interdisciplinary cancer rehabilitation. To provide interdisciplinary rehabilitation for all children and adolescents in the Stockholm Gotland region, a model will be tested for an interdisciplinary rehabilitation team at Karolinska University Hospital.

SOL team (palliative care consulting team)

In line with the care programme for palliative care for children and an environmental analysis, a new working model has been developed in 2023. It will be tested during 2024. With participation in various workshops, Barnfolketsdag, and text at Karolinska INUTI, the project has worked to disseminate information on ALB. By the end of the year, the SOL team had contact with 18 patients.

New roles are being tested

The role of the pharmacist has been expanded under the government initiative and has contributed greatly to increased patient safety, more efficient management of medicines through reduced residual volumes and thus lower costs. The role of the pharmacist has also contributed to an improved working environment by relieving other roles in times of high workload. The role of the pharmacist has been developed during the year in areas such as financial follow-up and participation in patient rounds, training for new employees and discharge interviews with new patients and their families.

Within the Healthcare Professions, three different roles were tested, a counsellor in the Pediatric Oncology Department, a development manager in the Neurorehab team and a family therapist in the Pediatric Hematology Department.

Skills development

In 2023, a number of skills development activities have been carried out. Skills development also takes place in regular operations – but the pediatric cancer initiative enables larger and more comprehensive skills development. Various observational and inspirational trips have been undertaken by different teams:

- Sick Kids Hospital, in Toronto, Canada
- Study visit to the pediatric radiation clinic at Princess Margaret in Toronto, Canada.
- Sunnaas Rehabilitation Hospital in Norway.
- Oslo University Hospital in Norway
- Education in Palliative and End-of-life Care, Advanced Pain and Palliative Care workshop in Rome, Italy.

Long-term follow-up (Key Clinic)

The routine for key visits during adolescence is well established and all patients at the Paediatric Oncology Department in Solna who have completed their treatment with chemotherapy or radiotherapy are offered visits according to the national care program for long-term follow-up at the age of 13, 17 and 18 and receive a written treatment summary with follow-up recommendations at the age of 18.

Allogeneic stem cell transplant patients have a final visit to the pediatric hematologist at age 18, where they receive a written treatment summary prepared by staff from the key clinic in Solna.

Research in the field of pediatric cancer

The pediatric oncology and pediatric coagulation departments from KI are active academic research, both basic and clinical research.

Basic research for solid tumours in oncology seeks to understand what distinguishes cancer cells that respond to treatment with chemotherapy and immunotherapy from cells that are resistant, identifying and characterise resistance factors, develop new medicines against resistance factors, while basic research for CNS tumours focuses on the radiation treatment and the role of the immune system in brain tumours.

Basic research on lymphoma is mapping genetic abnormalities at the single-cell level and whole-genome sequencing in GMS. Clinical research in paediatric oncology examines the acute and late toxicity of leukemia and solid tumours, clinical and genetic risk factors with the aim of developing more personalised treatments.

Coagulation research at the basic level identifies predictive or diagnostic biomarkers for hemostasis and coagulopathy in children while clinical research focuses on various clinical and laboratory aspects of hemophilia care.

We have participated in the development of European treatment recommendations for for children with osteosarcoma.

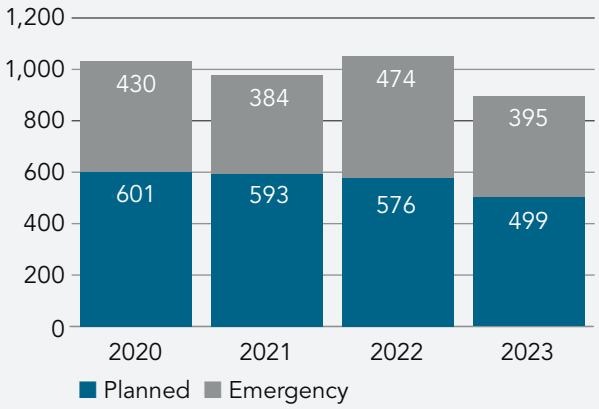
Publication: Diagnostic Yield From a Nationwide Implementation of Precision Medicine for all Children With Cancer. Pubmed.ncbi.nlm.nih.gov/37384868

Publication: The Swedish childhood tumor biobank: systematic collection and molecular characterization of all pediatric CNS and other solid tumors in Sweden. Pubmed.ncbi.nlm.nih.gov/37221626

Healthcare production and accessibility – children

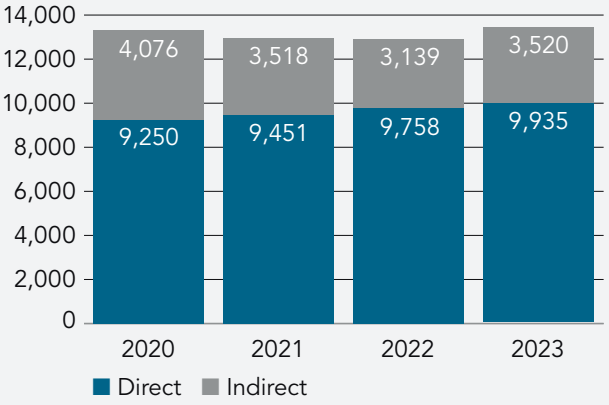
The incidence of childhood cancer diagnoses is over time relatively stable. Treatment and care of patient with childhood cancer is increasingly provided in outpatient or home care, which is a trend we see continuing in the coming years.

Figure 23: Number of planned and emergency admissions, 2020–2023.



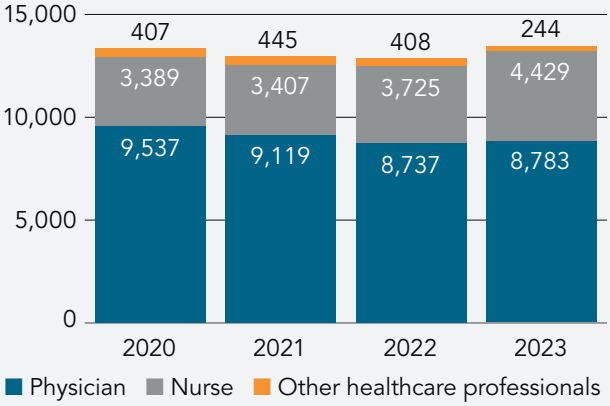
Admissions	2020	2021	2022	2023
Number of admissions	1,031	977	1,050	894
Proportion of emergency admissions	42%	39%	45%	44%
Number of hospitals beds	15,8	15,5	12,8	12,4

Figure 24: Number of direct and indirect visits, 2020–2023.



Outpatient	2020	2021	2022	2023
Proportion of indirect visits	31%	27%	24%	26%
Number of unique patients	2,239	2,373	2,447	2,501
Number of new visits	249	357	316	345
Number of unique patients and new visits	115	123	127	125

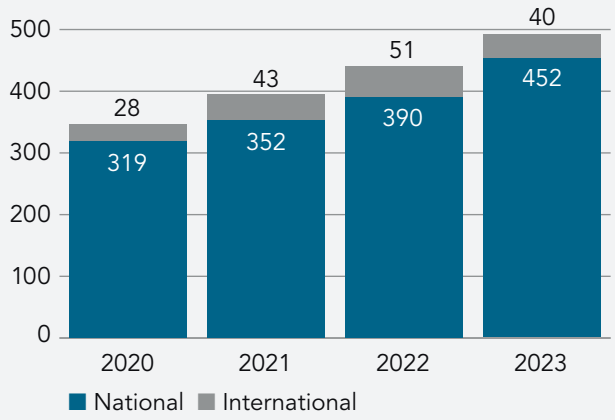
Figure 25: Outpatient contacts per category of healthcare provider, excluding radiotherapies, 2020-2023.



Outpatient care by healthcare provider	2020	2021	2022	2023
Physician	9,537	9,119	8,737	8,783
Nurse	3,389	3,407	3,725	4,429
Other healthcare professionals	407	445	408	244
Number of direct and indirect visits	13,333	12,971	12,870	13,461

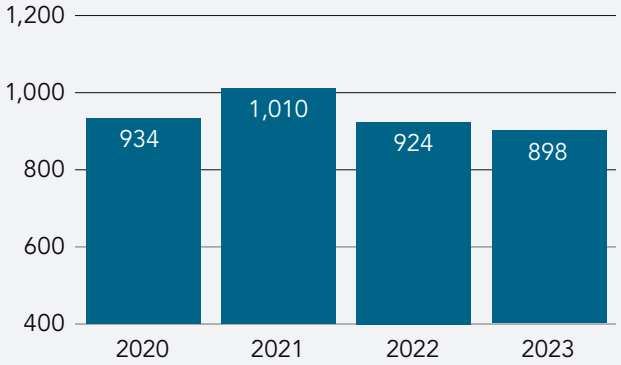
The proportion of national patients including tumor surgery is increasing. We also see an increase in care contacts in outpatient care for nurses as a result of developed working methods, such as nurse clinics and the introduction of contact nurses.

Figure 26: Number of national and international patients, 2020–2023.



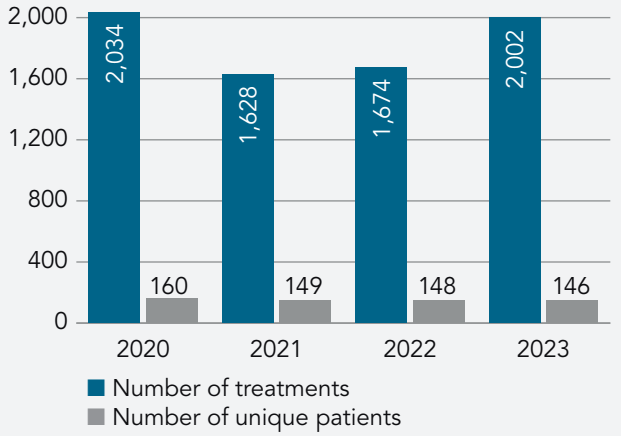
National and international patients	2020	2021	2022	2023
Number of outpatients visits	1,221	1,153	1,514	1,700
Number of admissions	147	137	165	111
Number of new visits, physician	32	54	51	67

Figure 27: Number of surgical interventions, 2020–2023.

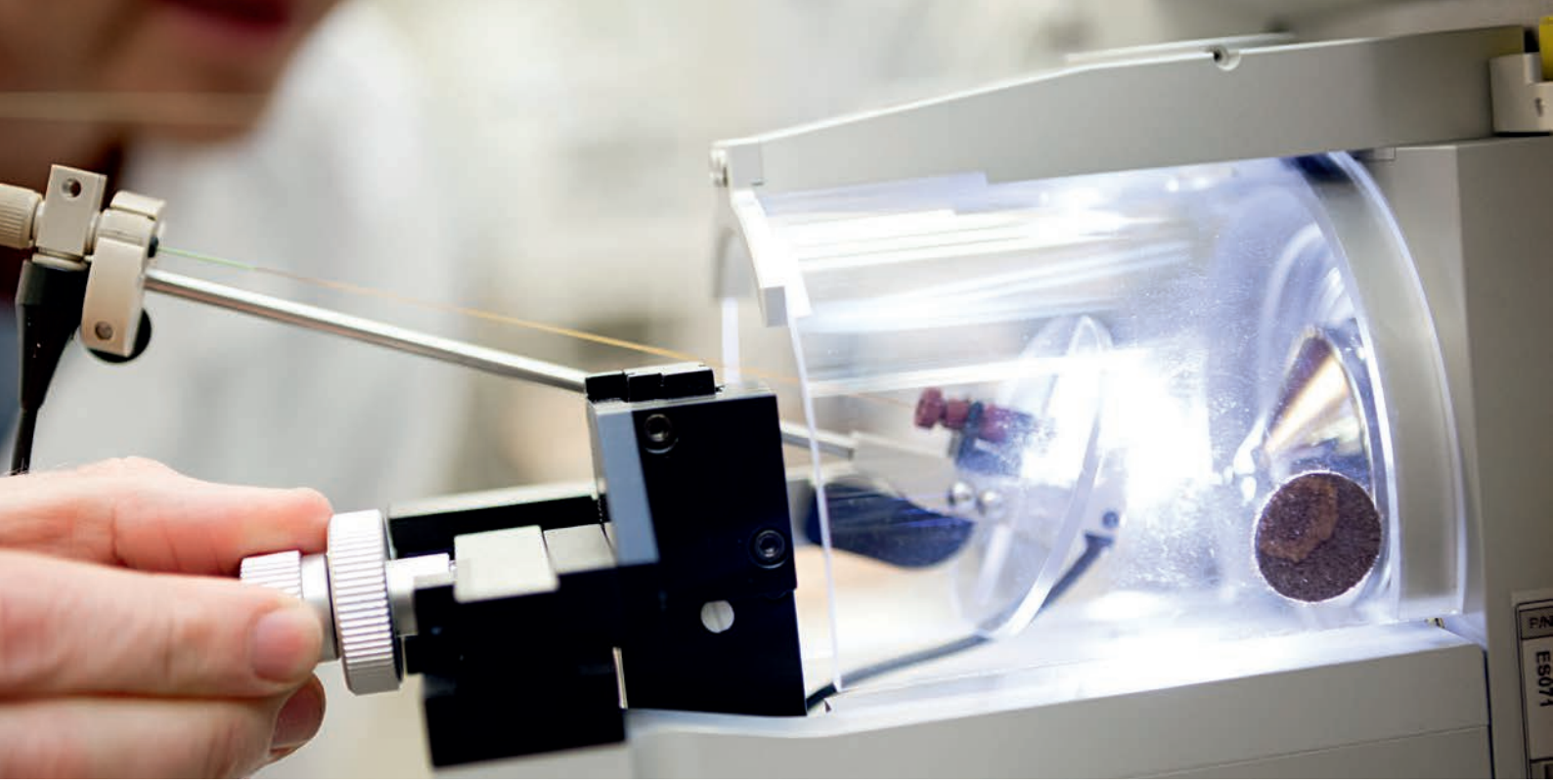


Surgery	2020	2021	2022	2023
Number of surgical interventions	934	1,010	924	898
Outpatient surgery	517	600	506	429

Figure 28: Number of treatments and unique patients, 2020–2023.



Treatment	2020	2021	2022	2023
Chemotherapy treatment				
Number of unique patients	160	149	148	146
Number of treatments	2,034	1,628	1,674	2,002



Medical Diagnostics Karolinska

Medical Diagnostics Karolinska is responsible for Karolinska University Hospital's overall care, research and education connected to KI, in the fields of radiology, medical radiation physics, nuclear medicine and the laboratory medicine all specialities.

The Proteomics Unit

The year 2023 has been a year of great progress at the Proteomics Unit at Karolinska's Department of Pathology and Cancer Diagnostics. Our team has focused on establishing several processes that lay the foundation for quality-assured precision medicine within healthcare. We have staffed a test preparation laboratory one floor below the hospital's pathology unit, where we are developing sustainable and seamless sample workflows. The test lab is part of the hospital's Precision Medical Diagnostics Development (PMDU) under the Precision Medical Centre Karolinska (PMCK) and the Precision Medical (PM) hub.

New processes have been developed to deliver digital patient consents through Region Stockholm's *Alltid Öppet* app, to create a safe temperature controlled transport from surgery to laboratory medicine and procedures to ensure traceability of patient material within and outside Karolinska University Hospital.

In 2023, a major milestone was reached in biobanking, where, with temperature-controlled sample transportation, we have collected more than 40 fresh-frozen surgical samples for biomarker discovery and testing of new precision medicine tools. In total, over 160 patients have been included in the PreDDlung pilot study, from which DNA, RNA and protein will be isolated and analysed at SciLifeLab Solna in 2024. Furthermore, as part of the PhenoPCM study, we also completed sample preparation and mass spectrometry-based proteomics data collection, further demonstrating the ability to generate robust proteomics and multiomics data from needle biopsies in clinical routine. In parallel, genomics analyses have been completed on the PhenoPCM cohort with iPCM panel sequencing.

These first results are crucial steps to improve Karolinska University Hospital's ability to meet the demands of the most advanced molecular analysis methods to date. It also clearly shows how we can achieve so much more with limited resources when robust working routines between different functions are implemented. Looking ahead to 2024, a complete version of the Molecular Tumour Board portal will be available, creating favourable conditions for taking further steps in the testing and implementation of the most advanced technologies, which clinicians will be able to use in the near future to support clinical treatment decisions. We look forward to the coming years as Karolinska University Hospital together with Karolinska Institutet leads the way within precision medicine.

Quality follow-up Theme Cancer

Patient satisfaction

The aim of the survey is to obtain more information about the patients' experience of the healthcare; treatment from healthcare staff, participation in decisions to the desired extent and whether the information provided has been sufficient. Since distribution of the survey has become automated, the number of respondents has increased significantly.

Also in 2023, participation has been an area in addition to treatment that we have had extra focus on, the result has improved on the whole. In 2023, the ambition has been for all operations to achieve the target value; we did not quite reach the end of the road in terms of participation.

Patient satisfaction	2021	2022	2023	Target
Treatment	85%	87%	88%	87%
Participation	85%	86%	87%	85%
Information	92%	95%	95%	90%
Number of respondents	2,424	18,628	27,788	—

Care – Nutrition, pressure ulcers and falls

Assessing patients' risk of malnutrition, pressure ulcers and falls is an important step in working with patient safety. From 2021, these indicators will be measured continuously. The information is retrieved directly from the medical record system and based on that documentation; the results report is digital and accessible to all. We see an increase in the number of risk assessed patients for all these measures, this is most likely due to the work with the real-time visualisation board at the departmental start-up meeting.

Nutrition

The purpose of follow-up is to ensure that good care is provided by early identification of patients at risk of malnutrition.

In 2023, the number of risk-assessed patients continued to increase even if we did not reach the target level. Malnutrition is a risk factor for about half of the patients who receive care at Theme Cancer according to completed risk assessments, in the autumn of 2023, a theme-wide multidisciplinary nutrition group was appointed to work on the issue, we believe that their work is needed to further improve the result.

Nutrition	2021	2022	2023	Target
Complete nutritional assessment	71%	74%	78%	80%
Percentage of patients with risk factors	52%	51%	51%	—
Percentage of patients at risk with prescribed measures"	77%	77%	77%	>70%
Number of unique patients	8,952	9,367	13,688	—

Pressure ulcers

The purpose of the follow-up is to ensure that good care is provided by preventing and reducing the incidence of pressure ulcers.

The survey shows that the number of risk assessments has increased compared to the previous year and that patients with an identified risk of pressure ulcers are prescribed preventive measures to the same extent as in the previous year.

Pressure ulcers	2021	2022	2023	Target
Percentage of patients assessed at risk for pressure ulcers on admission	77%	82%	88%	80%
Percentage of patients with acquired pressure ulcers, categories 2–4	—	0.50%	0.60%	3%
Percentage of patients at risk with prescribed measures	56%	66%	65%	60%
Number of patients	8,952	9,438	13,956	—

Falls

The purpose of the follow-up is to ensure that good care is provided by identifying patients at risk of falling early during their stay and taking preventive measures.

The survey shows that the number of risk assessments has increased compared to the previous year and that the number of patients with identified fall risks are prescribed preventive measures to the same extent as in previous year.

Falls	2021	2022	2023	Target
Percentage of patients assessed at risk for falls on admission	78%	82%	88%	70%
Percentage of patients with fall prevention measure prescribed within 24h	56%	69%	69%	65%
Number of respondents	8,952	9,367	13,688	—

Healthcare-related infections and hygiene

Healthcare-related infections (HCRI)

The primary purpose of the follow-ups is to serve as a basis for the improvement work carried out in each department within Theme Cancer to reduce the proportion of patients affected by HCRI.

HCRI outcomes within Theme Cancer are high for a number of reasons, including treatments that cause immune suppression, patients who are already susceptible to infection, and extensive surgical procedures.

In 2023, activities have continued to focus on accurate input data and to work with the automated reports generated by the Infection Tool. In 2023, work will continue with the aim of generating reports showing the proportion of patients with HCRI, the proportion of catheterised patients, commonly used antibiotics, and the number of days an indwelling catheter (KAD) and a central venous catheter (CVC) remain in place.

Basic hygiene and dress code (BHK)

This survey is an observational study that all units carry out every month. In 2023, the units' work has led to improved performance in all areas.

Both joint and operations-specific activities have led to an improved result in 2023. This year we finally reach the finish line!

BHK	2021	2022	2023	Target
Disinfection before and after, gloves and protective clothing are used correctly	74%	73%	75%	—
Outfit, rings, nails, and hair were correctly used	93%	92%	92%	—
All 8 sub-moments are correctly performed	70%	68%	71%	71%
Number of observations	1,777	2,260	2,875	—

Resistant bacteria with notification duty (ARB)

A survey was conducted of the proportion of hospitalised patients at increased risk of MRSA where complete MRSA cultures are taken on admission. The follow-up is done through point prevalence measurements twice a year.

The 2023 results show that we have improved our performance, but that we are not meeting the targets at Theme level.

There is a real-time visualisation board that helps facilities to see which patients have been risk assessed, which is probably one of the reasons for the improved results.

ARB	2021	2022	2023	Target
Patients with proper management according to health care program	72%	59%	64%	90%
Number of observations	150	425	421	—

Patient safety work

In 2023, the Chief Medical Officers conducted a patient safety dialogue with Theme management. The aim of the dialogue is to ensure a good patient safety culture where we can highlight risks and events to prevent healthcare injuries.

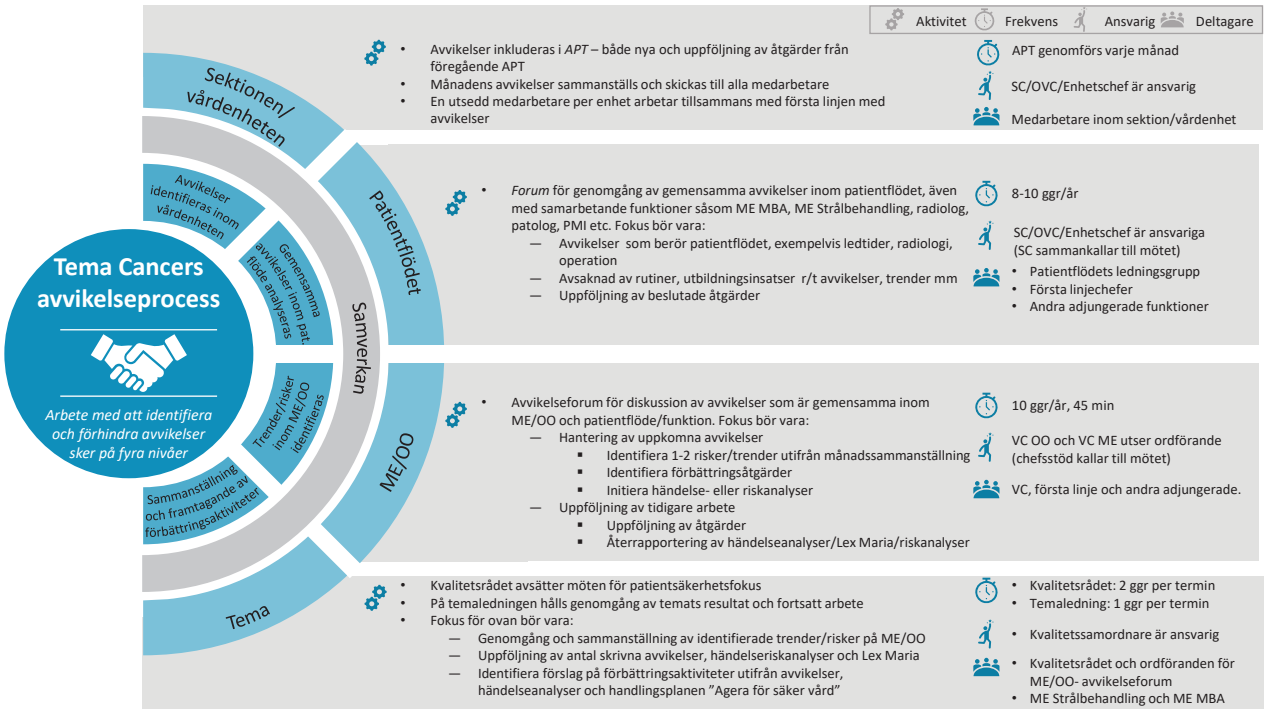
The structure of the dialogue is based on the national action plan "Agera för säker vård" (Acting for safe healthcare), which reviews the basic conditions for safe healthcare and examines prioritised focus areas.

During the autumn, these dialogues have continued at director level and most of the Theme management groups have had their own dialogues with the Chief Medical Officers on patient safety work.

A clarified procedure on the Theme healthcare deviations has been developed in connection with the organisational change to a two-track organisation. It has been clarified where in the organisation deviations are handled and how the cooperation regarding risks and trends regarding patient safety should be, as well as how we can learn from each other to prevent a repetition of errors.

Frida Bulukin, Business Development Officer, Theme Cancer.

Figure 29: Schematics of Theme Cancer's deviation process (in Swedish).



Our employees

Theme Cancer

Karolinska CCC is at the forefront of developments within the entire field of cancer, and our employees make outstanding contributions every day. We offer skills and career development for all employees. Several options are available to stimulate development and research within healthcare. We share and gain knowledge from around the world. The aim is to integrate academic healthcare development into the whole organisation.

Region Stockholm decided on restrictive external hiring of temporary staff. In 2023, Theme Cancer's hiring of temporary staff has steadily decreased and now has no temporary nurses. Theme Cancer has a positive trend in the percentage of staff remaining after 2 years.

Figure 30: Cancer Theme has a positive trend regarding what percentage of the staff remains after 2 years.

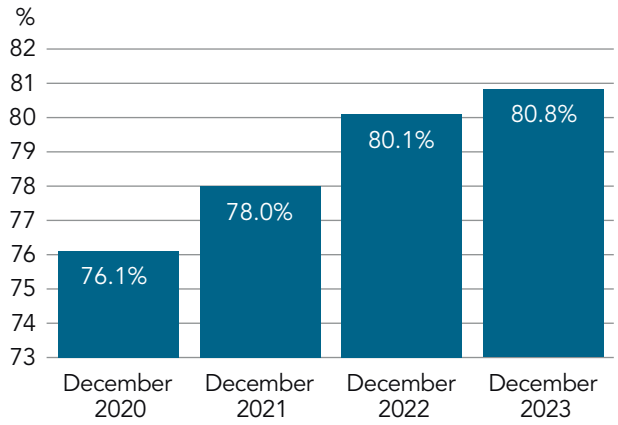


Figure 31: The number of employed nurses within Tema Cancer has increased after restrictions on external hiring were decided and in 2023 has been at a significantly higher level than in previous years.

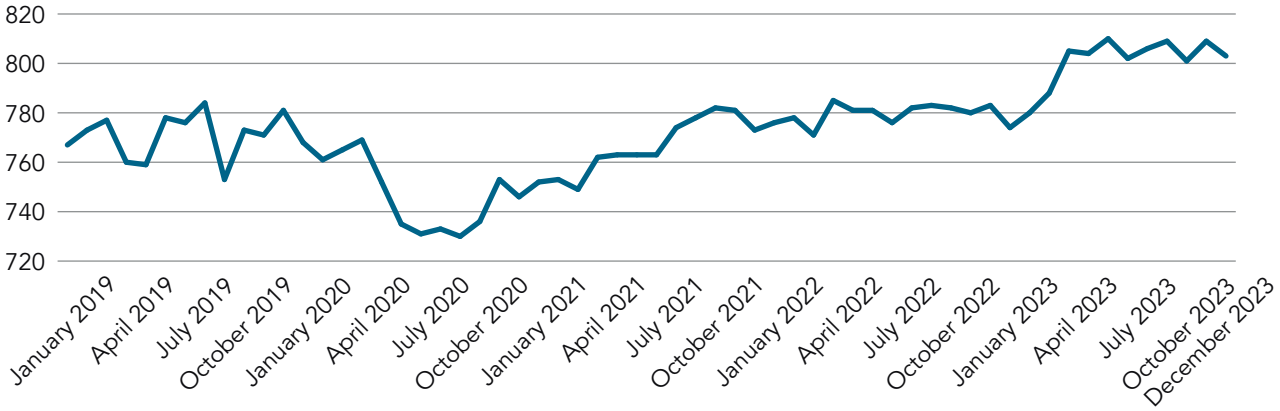
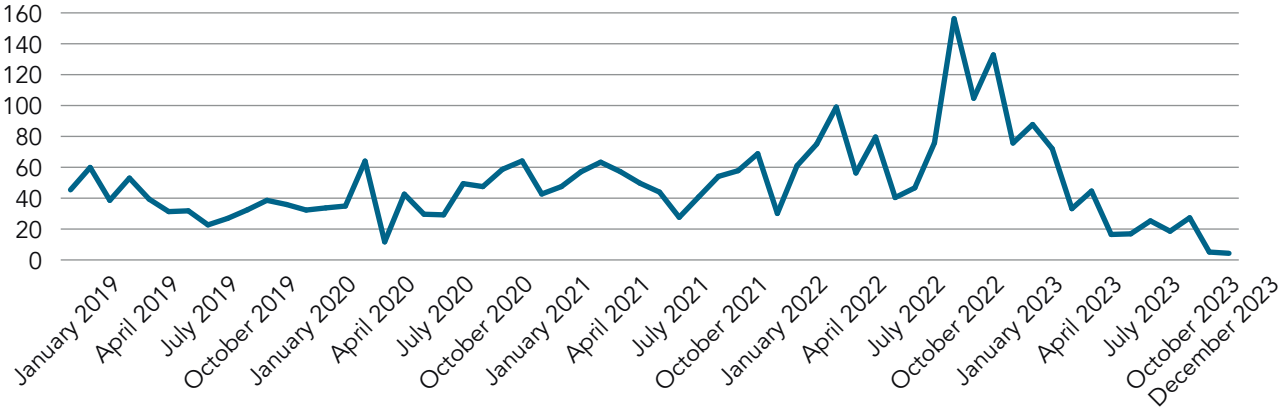


Figure 32: Region Stockholm decided on restrictive external hiring of personnel. During 2023, Tema Cancer's hiring has steadily decreased and now has no externally hired nurses.



Mapping of the organisational and social work environment

In the mapping of organisational and social work environment (KOSA) 2023, Theme Cancer's results have further improved compared to the previous year and are above the average for the hospital and regions. The Sustainable Employee Engagement (HME) index has increased five points to 82 for 2023.

Theme Cancer ranks first in eNPS score when compared to clinical operations within Karolinska, and third among all Karolinska's operations. The value of the Employee Net Promotor Score (eNPS) is calculated from the answer to the question "How likely is it that you would recommend Karolinska University Hospital as an employer to a friend or colleague?" and is calculated by the ratio between the proportion of ambassadors and the proportion of critics. Theme Cancer has the equivalent of 68 percent who are ambassadors or neutral, and 32 percent critics.

Figure 33: The Cancer Theme's performance on the Sustainable Employee Engagement Index (HME), 2023.

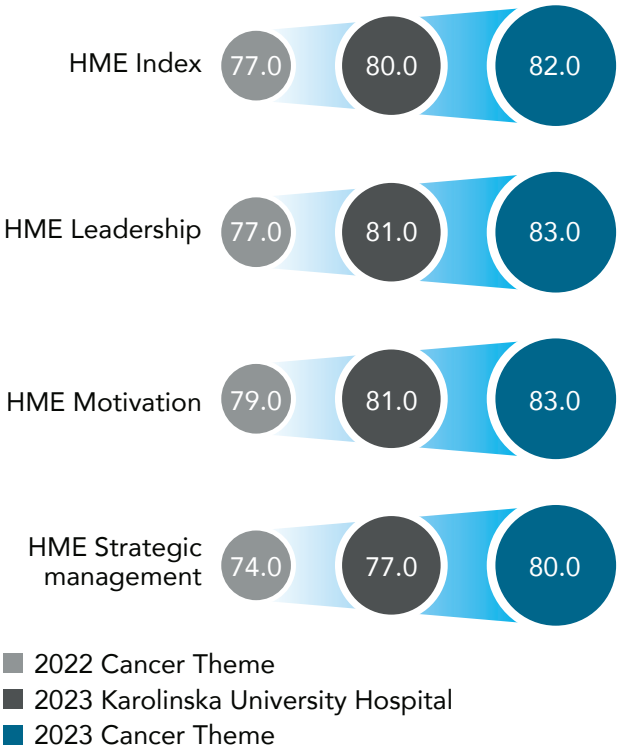


Figure 34: Cancer theme Employee Net Promotor Score (eNPS), 2023. The value is calculated based on answers to the question "How likely would you is it that you would recommend Karolinska University Hospital as an employer to a friend or colleague?".

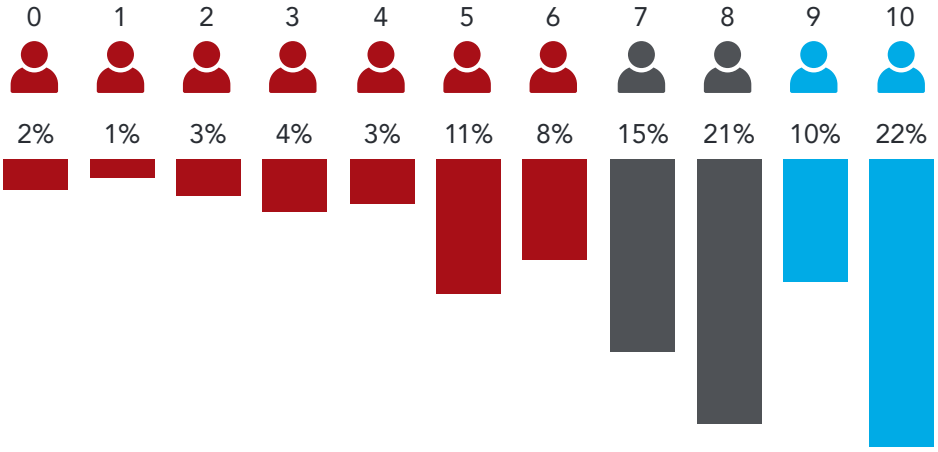
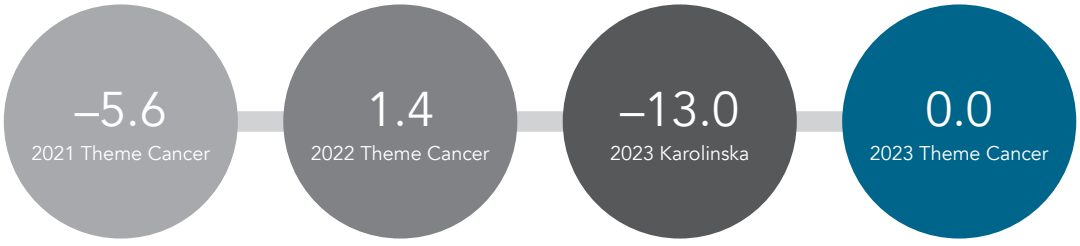


Figure 35: Trend in the aggregated Employee Net Promotor Score.



Successful transition away from hiring of temporary nurses

In 2023, there was a major drive to phase out temporary nurses, which was implemented across the region, enabling a united front. At Theme Cancer, the three Heads of Operations: Nursing 1, 2 and 3 have worked hard together to end the hiring of temporary nurses.

How did the hiring of temporary nurses affect your operations in the past?

"The hiring of temporary nurses allowed for a short-term coverage of nursing shortages but resulted in higher costs and less stability in the workforce, affecting both continuity and quality of care ," says Anna Wiberg.

The challenges were related to the availability, quality and cost of externally hired staff and convinced us that a long-term and sustainable solution was to recruit our own staff, especially with Region Stockholm's restrictions on hiring temporary staff," continues Karolina Fridblom.

What targets and metrics have been used in the phasing out of temporary nurses and the creation of the outlook?

"The goals we worked towards included reducing staffing costs and key performance indicators focused on increasing staff stability and improving the quality of care. The targets have been evaluated during the year through regular comparisons of costs, staff turnover and patient outcomes," says Camilla Hultberg.



From the left:
Camilla Hultberg Head of Operations OO1, Anna Wiberg, Head of Operations OO2 and Karolina Fridblom Head of Operations OO3.

Can you give examples of what you have achieved since the phasing out of temporary nurses?

"It has resulted in reduced costs for hiring temporary staff, reduced staff turnover and improved patient satisfaction. Increased financial transparency and control has been made possible by the transition to in-house staff and systems," continues Camilla Hultberg.

"Through successful leadership, we have together created a clear vision, engaged staff and provided resources to support the change. We have worked with close leadership, training programs and mentoring, which has strengthened staff and promoted cooperation," says Karolina Fridblom.

How has this affected the finances and performance of the operations during the year and their future?

"The result has been a more cost-effective and stable operation with improved quality of care and patient satisfaction. A recruitment campaign to offer jobs to more new Karolinska colleagues ran in parallel. For example, we have decided on a career initiative whereby specialist nurses are trained to become advanced specialist nurses in surgery, while maintaining their salary. A total of 6 such services are sponsored," says Anna Wiberg.

What lessons have you learned?

"Lessons learned include the importance of long-term human resource strategies, continuous evaluation and adaptation, and communication and engagement. We have learned to prioritise staff well-being, invest in long-term solutions, and by keeping open communication during the change, we have managed to promote a positive transition," says Anna Wiberg.

Our researchers

Cancer research KI

Over 400 cancer research leaders have been identified at KI and are listed and their research described in the Cancer Research KI database. The predominant cancer research areas at KI are pre-clinical research, blood cancer, brain and nervous system cancer, cancer epidemiology and breast cancer. The Department of Oncology and Pathology has the highest number of group leaders within the field of cancer research at KI.

Figure 36: Number of principal investigators per cancer research area at KI.

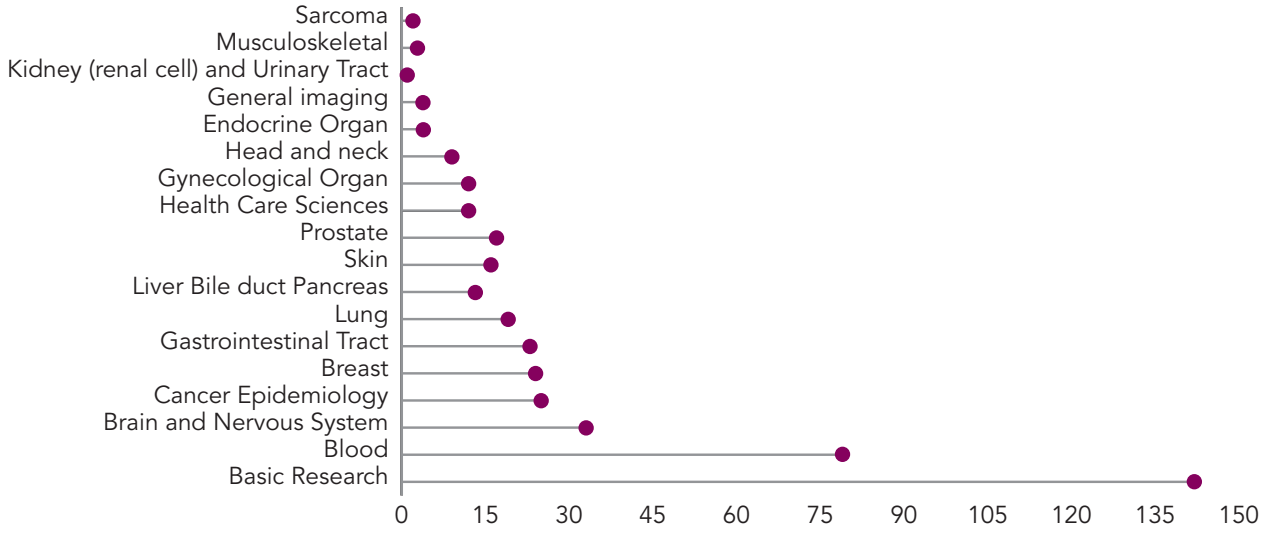
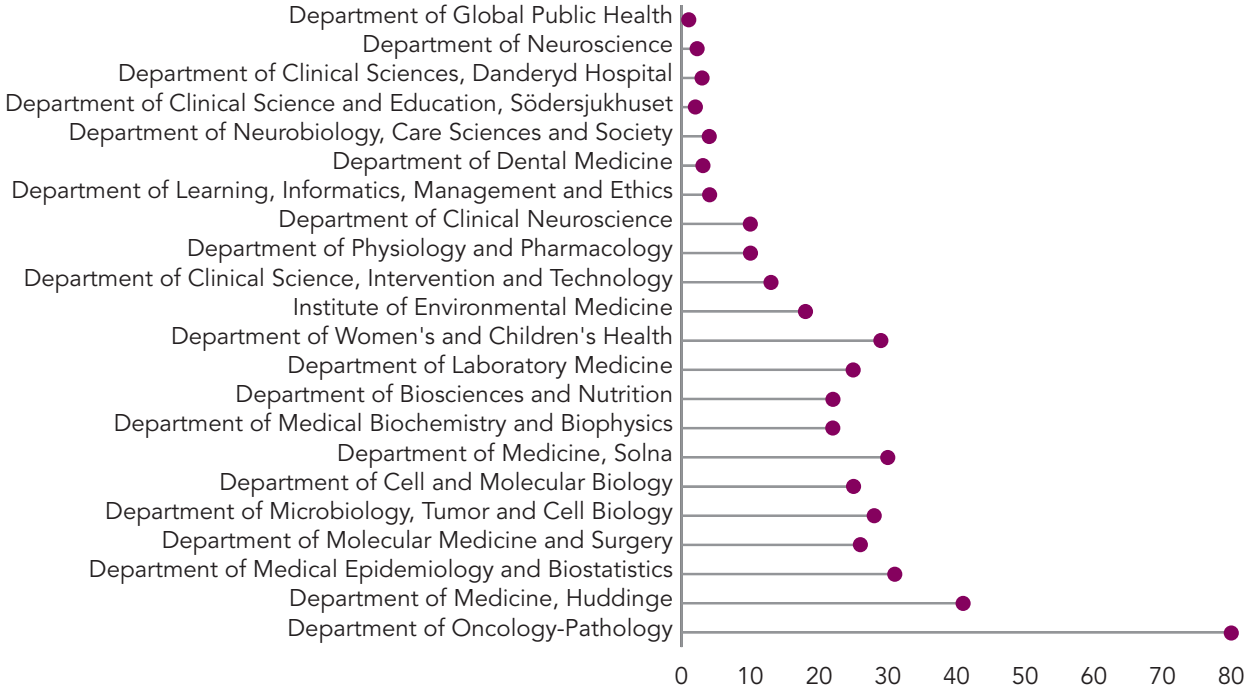


Figure 37: Number of principal investigators within the cancer area per KI department.



Cancer Research Funds of Radiumhemmet, newly created Professorships

The Cancer Research Funds of Radiumhemmet have taken the initiative to jointly fund and establish five new professorships with Karolinska Institutet, one in oncology, one in oncological immunotherapy, one in oncological surgery and two in tumour pathology.

On January 1, 2023, Simon Ekman took up the professorship in Oncology at Karolinska Institutet, he was already responsible for research and education in the Head-Neck-Lung and Skin Cancer section and now wants to contribute to making research a natural part of the hospital.

> "Representing a subject like oncology means a responsibility to develop the whole field of oncology. Above all, we want to bring research more into the clinic, and here I see a broader mission to establish the link between Karolinska Institutet and Karolinska University Hospital, which is also in line with Karolinska's role as a Comprehensive Cancer Centre (CCC). By continuing to develop training and promoting exchange for translational research, we can achieve new discoveries. This is where I feel a responsibility for the whole."

Andreas Lundqvist assumed his position on February 1, 2023 and looks forward to continuing contributing to the research field as Professor of Oncological Immunotherapy at Karolinska Institutet.

> "It means a lot to have been offered this position. It is like a seal of approval for our research, an acknowledgement that we are doing something important that can benefit sick patients. As professor, I look forward to strengthening our research, contemplating how the research field will develop in the coming years and how we can best contribute to this development. I am extremely grateful that the Cancer Research Funds of Radiumhemmet make this possible."

On November 1, 2023, Olof Akre was appointed Professor of Oncological Surgery at Karolinska Institutet to strengthen patient-oriented research. A Senior Physician and Director of the Centre for Clinical Cancer Studies, he is the fourth person to assume one the five posts created with the support of the Cancer Research Funds of Radiumhemmet.

Johan Hartman was awarded the position of Professor of Tumour Pathology in 2022.

> "The support gives me and the research group the opportunity to further develop our exciting research projects within the field of AI, which in the long run contributes to more cancer patients being able to receive an individualised treatment for their disease. The grant also gives a stamp of quality to our research, an acknowledgement that what we do is important."

The fifth post is for an additional professorship in tumour pathology, which is currently under recruitment.

> "Anyone holding a professorship with support from us receives fifty percent of their salary from Region Stockholm, the other half is financed by joint funds with Karolinska Institutet," says Yvonne Brandberg, vice-chair of one of the two funds that make up the Cancer Research Funds of Radiumhemmet. The good thing is that the position is not limited in time, which allows for long-term clinical research. We see professorships as an important complement to grants for specific research projects.

New Professors and Senior Lecturers at Karolinska Institutet 2023

Professors

Simon Ekman
Olof Akre
Andreas Lundqvist
Elisabeth Epstein
Niklas Björkström
Annika Bergquist
Svetlana Bajalica Lagercrantz
Mats Lindblad

Senior Lecturers

Ninib Baryaw
Stephanie Bonn
Martin Enge
Signe Friesland
Marike Gabrielson
Emelie Heintz
Hildur Helgadottir
Kristina Hellman
Per Hydbring
Anton Lager
Johan Lundberg
Mariza Palma
Vicente Pelechano Garcia
Renske Altena
Mattias von Beckerath
Jeanette Winterling
Kaisa Fritsell
Marzia Palma
Maria Bruzeliys

Karin Thourot Nouchi, Simon Olsson Boström and Saha Cehic, Contact Nurses of the Year, RCC Stockholm-Gotland.

Awards

On Gynaecological Cancer Day, March 25, the Gynaecological Cancer Network awarded two of our staff members with the Eldsjälspriset. **Susanna Einarsson Berg**, Registered Psychotherapist and Specialist Nurse in oncology at the Psycho-Oncology Clinic and **Jeffrey Yachnin**, Medical Director, Phase 1 unit, Centre for Clinical Cancer Studies.

Maria Helde Frankling was awarded the Pfizer and Swedish Society of Oncology (SOF) research grant for her research efforts within lung cancer, at the Oncology Days in Kalmar on March 23, 2023.

Karin Thourot Nouchi, Simon Olsson Boström and **Saha Cehic** were named Contact Nurse of the Year on May 24 by RCC Stockholm-Gotland.

Sylwia Kedzierska, Biomedical Analyst at the Cytology Laboratory at Karolinska University Hospital in Huddinge. She was nominated and won the second prize in Vårdförbundspriset 2023.

Johan Hartman and **Mattias Rantalainen** were awarded the 2023 Innovation and Utilisation Award, wich is awarded to one or more researchers who have demonstrated outstanding utilisation of research results leading to an innovation.

Anna Martling, has been made an honourary member of the American College of Surgeons (ACS). Anna Martling is the fourth Swedish surgeon to receive this honour since ACS was founded. The award ceremony took place at the ACS Clinical Congress in Boston, USA in October, 2023.

Every year, the Daisy Award ceremony is held at Theme Cancer, where patients can nominate their nurse for great care. **Shirin Yar** who works at the MBA received 7 nominations from her patients and one of Shirin's patients described her encounters with Shirin during her cancer treatments as follows:

> "Getting a cancer diagnosis is a terrible shock, and having to go through all kinds of treatments, examinations and procedures does not make life any easier. But Shirin Yar does. Anything you want, she takes care of it right away and you do not have to wait. I have the feeling that Shirin knows and remembers her patients. You feel special."

Sustainability

The hospital has a joint Sustainability Program for 2023–2027 with goals in four areas: financial sustainability, sustainable work environment, social sustainability and environmental sustainability. The operations choose activities to contribute to the targets based on their operations and how to make the most impact.

In 2023, the operations within Theme Cancer worked on 33 sustainability activities linked to the sustainability programme. All operations worked on two activities each to contribute to the hospital's joint sustainability goals. The status of the work is done on a quarterly basis. These included reducing healthcare waiting times, raising awareness of social sustainability, adapting communication for accessibility, improving the management of medicines and the choice of materials. By increasing the use of bio-based aprons reduced CO_2 emissions by around 13 tonnes, 2022–2023.

Figure 38: Breakdown of Theme Cancer's sustainability activities linked to the to the sustainability programme, 2023.

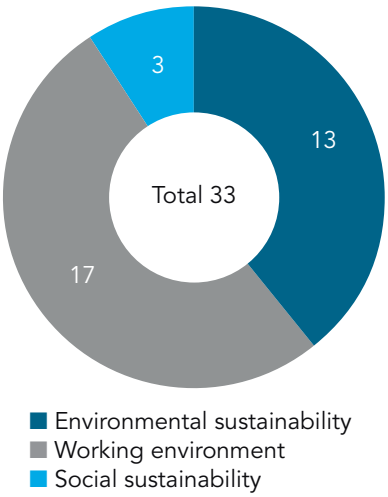
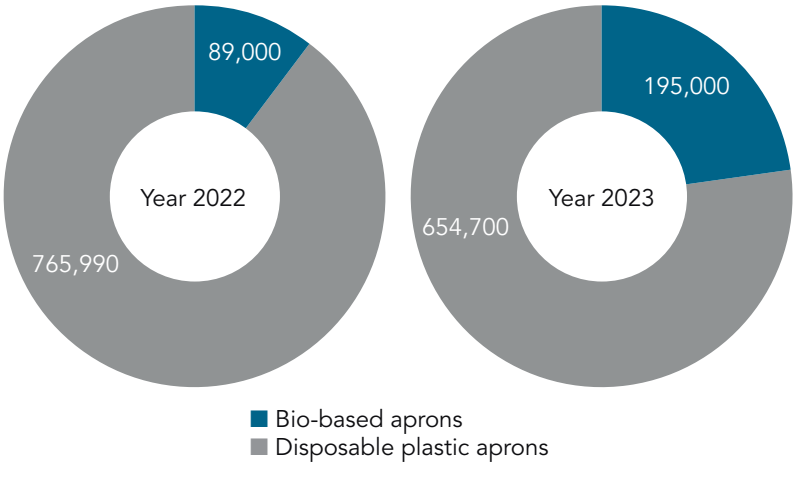


Figure 39: Number of bio-based aprons in relation to standard disposable plastic aprons, 2022–2023.



Patient and relatives collaboration during the year

The Patient and Relatives Council (PNR) at the Regional Cancer Centre (RCC) Stockholm Gotland has appointed two people to represent them centrally within Karolinska CCC and Theme Cancer. In addition, several representatives are involved in e.g. the Precision Medicine Centre in various processes, management groups and projects. Karolinska CCC has also appointed a patient representative to the Board of Directors.

The research strategy

In January, a number of patient/relatives representatives attended the conference to develop the Karolinska CCC research strategy. It revealed the following about patient/relatives involvement and Karolinska CCC will:

- Systematically develop the collaboration to increase patient involvement in the development of cancer care, research and education.
- Representatives from patients and relatives can help identify issues, design methods and recruit patients.
- Patient and relatives involvement throughout the research process increases the possibility of implementing research results.
- Involvement of patients and relatives can improve the quality of research.

Patient Collaboration Working Group

We have been working on a gap analysis of the existing patient criteria for the re-accreditation of Karolinska CCC. Work practices to close the gaps identified have been initiated.

Margareta Haag, Chair, Network against Cancer.

Theme Cancer strategic collaboration – Patient/Relatives Council

As representatives on the Strategic Council of Theme Cancer, we have discussed the following during the year

- Availability of contact nurses
- Patient involvement
  - what it looks like today and how it can be improved
  - why patient involvement is important and what skills and experience are needed for the different tasks.
- Outcomes for standardised care pathways, SVF

We have developed a survey together in a working group to measure how patients view continuity.

Key areas for the future from our perspective as representatives from patients and relatives

- Development and application of the contact nurse role in Theme Cancer including Min vårdplan
- Accessibility
  - Person-centred accessibility from a patient perspective in all the roles the patient comes into contact with.
- Patient/relatives involvement
  - That all themes have effective patient involvement in place
  - The creation of a network of representatives for patients/relatives who meet regularly to learn from each other and help disseminate good practice. For example, the representatives from the different flow management groups can be part of this network, but there can also be other representatives from different groups.
  - How Karolinska CCC/Theme Cancer finds relevant representatives for patients/relatives
    - Different requirements for different roles depending on the mission

As representatives of patients and relatives, we conclude that patient/relative interaction has improved during the year and that there are good conditions for continued development and improvement in 2024.

Karin Liljelund, President, Lung Cancer Association.

Innovation and Development

Karolinska ATMP Centre

In 2023, Björn Zoëga, Director of Karolinska University Hospital, and Annika Östman Wernerson, President of Karolinska Institutet, signed an agreement to establish a new joint centre for advanced cell-, gene- and tissue therapies.

This type of treatment is often referred to internationally as ATMP, which is an abbreviation of Advanced Therapy Medicinal Products. The major advances in the research and development of drugs in the ATMP field have the potential to treat and cure diseases in a way that has not been possible with traditional drugs and treatments.

The Karolinska ATMP Centre is financed equally by Karolinska University Hospital and Karolinska Institutet. The centre brings together the development of cell-, gene- and tissue therapies in one organisation and provides an important basis for strengthening collaboration with neighbouring regions and pharmaceutical companies, as well as national and international collaborations.

Karolinska Institutet and Karolinska University Hospital are together among the leaders in research,

manufacturing and treatment with ATMP in Europe. Today, there is a large JACIE-certified area covering all themes and functions, which includes CAST, Clinical immunology and transfusion medicine (KITM) and Pediatric Hematology, which collectively stands for the clinical part of cell and gene therapy within the Karolinska ATMP Centre. The stem cell laboratory, the Vecura GMP unit at the Karolinska Centre for Cell Therapy (KCC) in Huddinge, which today consists of 13 clean rooms, produced Sweden's first gene therapy drug for clinical trials in 1997 and the first CAR-T cells for clinical trials in Europe in 2014.

Anna Somell, Head of Section, Perioperative medicine and intensive care and Stephan Mielke, Director of CAST.

Another GMP facility with a specific focus on immunotherapy is located in Solna. In 2019, the Nordic region's first pre-GMP unit was inaugurated at Karolinska Institute Campus Flemingsberg, with five clean rooms. The pre-GMP unit is an important bridge between research laboratories and Vecura and has played a crucial role in the development of two therapeutic products that are currently undergoing clinical trials.

Medical Unit Cell Therapy and Allogeneic Stem Cell Transplantation

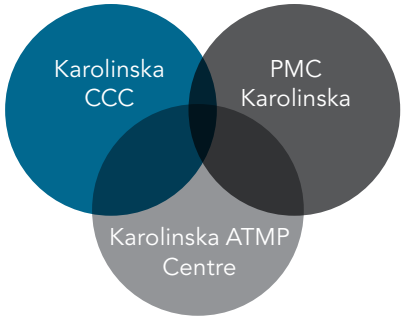
Co-operation on cell and gene therapies has a long tradition and already in 1975 the unit for Cellular Therapy and Allogeneic Stem Cell Transplantation (CAST) were established. CAST is JACIE-accredited and manufactures the cells that for example patients suffering from leukaemia need after radiotherapy. CAST performed Sweden's first standard treatment with CAR-T cells in 2019. Today, CAST offers a number of ATMP medicines in standard treatment and for clinical clinical trials. CAST's University Health Care Units (USV Unit) are responsible for all aspects of translational research from bench-to-bedside and also from bedside-to-bench.

Watch the film "We have something very special here at Campus Flemingsberg" on play.mediaflowpro.com/ovp/14/77CCTFZLNC or scan the QR code:

Formation between Karolinska Institutet and Karolinska University Hospital

Since 2020, three joint KI/K centers have been created, namely Karolinska CCC, the Precision Medicine Centre Karolinska and the Karolinska ATMP Centre, which reflect three strategic transnational areas between the University and Healthcare that overlap with each other.

Figure 40: Three strategic center formations between Karolinska University Hospital and Karolinska Institutet.



Task-shifting for suspected oesophageal and gastric cancer

Standardised care pathways (SVF) can be used as a tool to measure and analyse activities. At the Upper Abdomen Clinic, contact nurse-led new visits during investigation of two cancers – oesophageal and gastric – have been conducted. By working on the processes and replacing a surgeon with a contact nurse, several clear quality and efficiency gains have been observed. In the past, patients and their families have met with a surgeon during a new visit. This has meant some delay caused by limited clinic hours, due to the surgeons' fixed times for working in surgery. In addition, difficulties in coordinating other planned studies have been identified.

The aim of the contact nurse led clinic is to offer patients quick and more flexible clinic visits in order to shorten SVF times and contribute to a better coordinated care pathway with the addition of a more holistic medical history.

> "Contact nurses are able to offer quick and more flexible clinic appointments. We can also devote more time to the new visits and also avoid any interruptions during the meeting," says Simon Olsson Boström.

Since its launch in January 2023, around 80 new visits have been led by a contact nurse. The initial visit consists of informing the patient of the planned course of investigation, assessing the patient's general condition and functional status, and recording a full medical history.

Strengthening the patient and sustainability perspective

The new work practice has also resulted in a more holistic medical history as the nurse includes in depth relevant nursing aspects such as nutrition, social habits, alcohol, tobacco, pain, functional level, etc. At the multidisciplinary conference (MDK), the

contact nurse can then present a more holistic view of the patient's situation to the team, which forms an important basis for the conference's recommendation for treatment.

A further aim of the contact nurse-led clinics has been to offer patients referred to the clinic, within the framework of the SVF, appointments that can also be synchronised with other scheduled examinations such as X-rays or gastroscopy.

> "This contributes to a better coordinated investigation chain and reduces the amount of travel for patients, which is particularly helpful for those patients who live far from the hospital," says Saha Cehic.

Skills development of the contact nurse role

The patients' experiences of new visits to the contact nurse will be evaluated to refine the method and see if it is possible to further develop the work on prehabilitation. Contact nurse-led new visits have contributed to strengthening the professional role.

> "In the future, we will evaluate patients' experiences of new visits with a contact nurse in order to develop the new work practice. We feel that this has strengthened our professional role and contributed to improving our skills," says Karin Thourot Nouchi.

MinKod: An innovation project

MinKOD is an innovation project about and with teenagers and young adults (16–30 years old) in cancer care. The overall goal of the MinKod project is to work towards facilitating/maintaining the lives of teenagers and young adults affected by cancer through co-creation with cancer survivors, researchers and healthcare professionals.

Participants in the MinKod project team.

Providing psychosocial support

Part of this project involves developing and implementing new work practices that aim to give every young adult the support and tools to better manage their cancer journey! We have worked with patients' experiences to develop a structured work practice to improve how we identify and offer psychosocial support to young people with cancer. The work practice is that ALL teenagers and young adults newly diagnosed with cancer are booked for a visit with Team Young. The purpose of the information visit is for Team Young to identify the individual's psychosocial well-being and clarify the psychosocial support available to them. The visits also include offering everyone the opportunity to participate in the individual psychosocial support program PRISM (Promoting Resilience in Stress Management), which aims to provide young people with tools to better cope with the psychological stresses of cancer. In addition, Theme Young can provide support to both patients and staff caring for young people in this age group during the patient's care process.

This work practice has in the autumn of 2023 started to be introduced on some patient flows at Karolinska and Sahlgrenska, and we continue together to further develop work practices and introduce it in 2024 on more flows.

Staff support

Another part of this project is to develop a support tool for staff dealing with young people with cancer! In 2023, we have started developing a prototype for a short digital training course that will be provided through the RCC collaboration. The training will cover what to think about when you have a young patient with cancer, as well as how to deal with topics particularly important for young people such as sexuality and fertility.

Partners in MinKOD in 2023

- Karolinska Comprehensive Cancer Centre
- Sahlgrenska Comprehensive Cancer Centre
- Young Cancer (Ung Cancer)
- Centre for Person-Centred Care, University of Gothenburg
- Department of Nursing, Karolinska Institutet.
- Sophiahemmets Högskola
- Regional Cancer Center Stockholm-Gotland and Regional Cancer Center Väst

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Karolinska Institutet

KAROLINSKA UNIVERSITY HOSPITAL

Karolinska Comprehensive Cancer Center