Better Cure and Care – Childhood Cancer Research Symposium 2025

Karolinska Institutet

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On 25-26 September 2025, Department of Women's and Children's Health's division for Pediatric Oncology and Pediatric Surgery is hosting a scientific symposium on Childhood Cancer in conjunction with our 30-year anniversary since our division was established.

Anna Nilsson, Professor/Senior Physician | Head of Division

Over the 30 years that the Childhood Cancer Research Unit at Karolinska Institutet has been active, both Swedish and international pediatric oncology have made significant progress. A key factor behind this success has been strong collaboration - both nationally and internationally something we wish to highlight through this symposium.

Early on, clinicians and researchers within pediatric oncology made a joint decision to work together to improve care and strengthen the academic foundation of childhood cancer treatment in Sweden and the Nordic countries. This shared vision has led to the development of a comprehensive research unit at KI, encompassing preclinical research, pediatric nursing science, translational pediatric oncology, and clinical studies.

Today, we look to the future. With investments in precision medicine, immunotherapies, and the development of new drugs, we aim to cure more children - with improved quality of life as a result. A warm welcome to a symposium where we reflect on the past, but above all, look ahead.

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Programme

Thursday - September 25

08.00 - 09.00 Registration

09.00 - 12.00 Symposium I

09.00 - Welcome and introductory, **Anna Nilsson**, Professor, Head of Division Pediatric Oncology and Pediatric Surgery, Karolinska Institutet.

09.10 – **Pamela Kearns,** Professor University of Birmingham, Head of ITCC

10.00 - **Coffee break**

10.15 – **Novel cell and gene therapies for treatment of childhood cancers - Magnus Essand**, Professor, Uppsala University

10.35 – **Systems level immunomonitoring in children with solid tumors - Petter Brodin**, Professor, Karolinska Institutet

11.00 – **Pediatric Oncology Nursing Research in Low- and Middle-Income Countries 2000-2025: Practice Challenges and Solutions - Julia Challinor**, Associate Professor, University of California San Francisco

11.50 – **Caring practices during the child´s cancer trajectory - Experiences of young children with cancer and their parents - Karin Enskär**, Professor, Uppsala University

12.15 - **Lunch**

13.15 -16.00 Symposium Session II

13.15 – **Important but limited progress in relapsed paediatric bone sarcomas: where next? - Martin McCabe**, Professor, University of Manchester

14.05 – **Novel treatments for high-risk neuroblastoma - Daniel Bexell**, Associate Professor/Senior Lecturer, Lund University

14.25 – **Sofie Degerman**, Professor, University of Umeå

14.45 – **ALLTogether1 – treatment trial for ALL in children and young adults: opportunities, achievements and challenges - Mats Heyman**, Senior Lecturer, Karolinska Institutet

15.10 - **Coffee break**

15.30 – **Selected abstract** from Karolinska Institutet (PhD students/postdocs)

- Hala Habash, Drugging the undruggable target: Gemcitabine and cytarabine kill Ewing sarcoma cells through inhibition of SAMHD1 and degradation of the Ewing sarcoma fusion protein

- Sara Abu Ajamieh, Targeting Teneurin 4 suppresses tumor growth and induces differentiation in neuroblastoma

- Ingrid Lilienthal, Uncovering novel treatment resistance mechanisms in acute myeloid leukemia

16.00 - 18.00 Poster session with mingling reception

Friday – September 26

08.30 Registration

09.00 - 12.00 Symposium Session III

9.00 – **Translating observation into prevention and remediation of accelerated aging in childhood cancer survivors – Kirsten Ness**, Professor, St. Judes Children's Hospital

09.50 - **Cardiovascular Diseases in young cancer Survivors. Insights from the Rebuc study - Laila Hubbert**, Associate Professor, Linköping University

10.10 – **Coffee break**

10.30 - **Patient-derived stem cell models reveal key drivers and vulnerabilities in medulloblastoma - Margareta Wilhelm**, Principal Lecturer, Karolinska Institutet

10.55 - **Elias Kumbakumba**, Senior Lecturer, Mbarara University of Science and Technology, Uganda

11.15 – **Selected abstract** from Karolinska Institutet (PhD students/postdocs)

- Gustaf Hellspong, LiBRA, Lithium treatment to prevent cognitive impairment after brain radiotherapy

- Amal Nazaraliyev, Improving pre-clinical models of radiation-induced growth plate injury

- Malin Sveijer, Reduced Quality of Life after Childhood Langerhans Cell Histiocytosis: Can we make a change

– **Isabelle Billstein**, Patient and parent participation in clinical ethics support services in pediatric cancer care – an emerging moral dilemma

12.00 – **Closing ceremony**

Malin Wickström and Nikolas Herold

12.30 -13.30 Lunch

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Every day, we're inspired to think differently and follow the science to transform the lives of people around the world living with a rare disease. These three tenets continue to guide our decisions.

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Our patients and caregivers are at the center of all we do. They're the experts in the rare diseases journey, and our decisions are guided by what we hear is important to them.

We aim to improve equity and health outcomes for people living with rare diseases by focusing on reducing the time to diagnosis, improving access to care, and engaging stakeholders globally to amplify impact.

Keynote speakers

Pamela Kearns, PhD FRCPCH, is Emeritus Professor of Clinical Paediatric Oncology at the University of Birmingham, where she was Director of the University of Birmingham's Cancer Research UK Clinical Trials Unit from 2011-2023 and Director of the Institute of Cancer and Genomic Sciences from 2021-2024. Her research is focussed of drug development and innovation in the design and delivery of national and international clinical trials for childhood cancers.

She is President of the European not-for-profit organisation 'Innovative Therapeutics in Childhood Cancer' (ITCC) and a Founding Board member of multistakeholder platform 'ACCELERATE', promoting drug development for cancer in children and young people. She was President of the European Society of Paediatric Oncology (SIOPE) from 2019 -2021 and served in the SIOPE Board until December 2024.

In the UK, she chairs IMPACCT (Initiative for Multi-stakeholder Partnership to Accelerate Children's Cancer Trials) a national initiative seeking to improve UK trial delivery for young patients with cancer. She also chairs the Research Assessment Panel for Great Ormond Street Hospital Charity. She is Deputy Chair of the Board of Trustees for Cancer Research UK and also Chair of the Board of Trustees for A Child of Mine, a charity dedicated to supporting bereaved parents.

Julia Challinor, RN, PhD, MS Education, MS Med Anthropology, is an associate Adjunct Professor (volunteer) at the University of California, San Francisco, USA. Julia Challinor serves as a childhood cancer and nursing consultant for projects in Africa, Asia and Latin America. She is a long-time member of the International Society of Paediatric Oncology and is active in multiple global pediatric oncology initiatives, including the WHO Global Initiative for Childhood Cancer.

Martin McCabe is a lecturer at the University of Manchester. His laboratory research focuses on paediatric brain tumours and sarcomas. He is chief investigator for rEECur, a European trial into the use of chemotherapy in recurrent or refractory Ewing sarcoma. He is also chair of the National Cancer Intelligence Network's children and young adults clinical reference group, which analyses national cancer data in children and young people, and a member of the National Cancer Research Institute clinical studies groups for brain tumours and young people's cancers.

Kirsten Ness is a faculty member at St. Jude Children's Research Hospital, serving as the principal investigator for the Human Performance Lab and co-leader of the Cancer Control and Survivorship Program. She also holds a named professorship in cancer survivorship. Her research focuses on assessing physical performance and functional impairments, as well as developing interventions in exercise, physical activity, and nutrition to prevent and improve frail health in cancer survivors. Dr. Ness has received several awards, including the 2023 Gaylord Anderson Leadership Award from the University of Minnesota School of Public Health.

Speakers

Magnus Essand obtained his PhD in Uppsala in 1995 and received four years of postdoctoral training at the National Cancer Institute, NIH in Bethesda, USA. He returned to Sweden as an Associate Professor in 2000 and became Professor in 2009. Magnus has tutored eleven PhDs to completion of their thesis and published more than 80 original peer-reviewed scientific research articles, of which he is first or senior author of more than half, and 10 peer-reviewed overview articles as first or senior author.

Petter Brodin is a Professor and specialist physician at the Department of Women's and Children's Health at Karolinska Institutet. He leads the Pediatric Systems Immunology research group, developing new technologies to map the human immune system. His research aims to understand variations in the immune system in both healthy and diseased individuals, particularly how the immune system is shaped early in life and influenced by microbes. He also teaches in systems immunology, computational biology, and pediatrics.

Karin Enskär is a Professor of Paediatric Nursing at the Department of Women´s and Children´s Health, combined with employment as a Specialist Nurse at Uppsala University Hospital. Her research mainly concerns: Nursing care of children with cancer, Stress and pain during medical procedures, Children as next of kin, and Child and School Health services.

Daniel Bexell is an Associate Professor and Senior Lecturer at the Division of Translational Cancer Research at Lund University. He leads the Molecular Pediatric Oncology research group and is the principal investigator at Lund University Cancer Centre (LUCC). His research focuses on understanding the mechanisms behind metastasis and treatment resistance in the childhood cancer neuroblastoma, as well as developing new treatment strategies for this aggressive disease. In 2023, he was awarded the prestigious ERC Consolidator Grant for his work in neuroblastoma research.

Sofia Degerman is a Professor in Biomedical Laboratory Science and a Principal Investigator at Umeå University, Sweden. She has a strong background in translational research, with a particular focus on childhood acute lymphoblastic leukemia (ALL). Her research aims to advance precision medicine by identifying molecular biomarkers in T-cell malignancies. Her research team has identified a DNA methylation classifier with prognostic relevance in childhood T-ALL. She also chairs the T-ALL Biology Special Interest Group within the European ALLTogether consortium, which is dedicated to enhancing diagnostics, treatment strategies, and biological understanding of T-ALL.

Mats Heyman is a Senior Lecturer/Senior Physician at the Department of Women's and Children's Health, Karolinska Institute, with a clinical and research focus on pediatric oncology and hematology. His research group work on improving diagnosis, treatment, and quality of life for children with leukemia and other hematological malignancies. His research addresses risk stratification, drug response, and treatment-related toxicity in pediatric acute lymphoblastic leukemia.

Laila Hübbert, MD, PhD, is an Adjunct Associate Professor (Docent) in Cardiology at Linköping University and a consultant at Vrinnevi Hospital, Norrköping. She specializes in cardio-oncology, focusing on the long-term cardiovascular health of cancer survivors. Hübbert leads the national "Rebuc" cohort study, which investigates how cancer treatments, socioeconomic factors, and other variables affect long-term morbidity and mortality. Her work bridges clinical practice and population-based research, aiming to improve long-term care and outcomes for cancer survivors.

Elias Kumbakumba is a distinguished academic and researcher at Mbarara University of Science and Technology in Uganda, where he has been contributing to the field of pediatric infectious diseases and public health since 2012. His work centers on the epidemiology of infections in vulnerable populations, especially children, and he has played a key role in advancing understanding of post-discharge mortality and sepsis in resource-limited settings.

Margareta Wilhelm is an Associate Professor of Tumor Biology and a Research Group Leader at the Department of Microbiology, Tumor and Cell biology (MTC). Currently she is the Head of the Tumor Biology Division and Vice Prefekt at MTC. The Wilhelm lab focuses on understanding mechanisms regulating tumor initiation and progression with a specific interest in the tumor microenvironment and infiltrating immune cells. The lab is using transgenic models, cellular reprogramming, stem cells, and brain organoids to model tumor development.

Selected abstracts' speaker

Hala Habash
Drugging the undruggable target: Gemcitabine and cytarabine kill Ewing sarcoma cells through inhibition of SAMHD1 and degradation of the Ewing sarcoma fusion protein

Sara Abu Ajamieh
Targeting Teneurin 4 suppresses tumor growth and induces differentiation in neuroblastoma

Ingrid Lilienthal
Uncovering novel treatment resistance mechanisms in acute myeloid leukemia

Gustaf Hellspong
LiBRA, Lithium treatment to prevent cognitive impairment after brain radiotherapy

Amal Nazaraliyev
Improving pre-clinical models of radiation-induced growth plate injury

Malin Sveijer
Reduced Quality of Life after Childhood Langerhans Cell Histiocytosis: Can we make a change

Isabelle Billstein
Patient and parent participation in clinical ethics support services in pediatric cancer care – an emerging moral dilemma

State-of-the-art tools and techniques set the stage for future scientific discoveries. Our scientists and engineers tirelessly work to develop novel approaches and elevate the work of fellow researchers. Our commitment to the scientific community is evident with every creative solution.

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Speakers' abstracts

Pediatric Oncology Nursing Research in Low- and Middle-Income Countries 2000–2025: Practice Challenges and Solutions

Local nursing research evidence considers context including available resources and legal and cultural expectations of scope of practice. In countries with lower sociodemographic status, where >80% of children/adolescents live, patients with advanced disease at diagnosis receive treatment dependent on access to essential medicines, advanced medical devices, specialized nurses and other critical infrastructure and services.

Recent nursing research findings in these settings are presented to document challenges and solutions. Sharing this nursing research informs global nursing practices when caring for young patients with cancer and families navigating disparities in social determinants of health such as migration, poverty, and low health literacy.

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Julia Challinor

Systems level immunomonitoring in children with solid tumors

Cancer is the leading cause of death from disease in children. Survival depends not only on surgery, cytostatic drugs, and radiation but also on systemic immune responses. Factors influencing these immune responses in children of different ages and tumor types are unknown.

Novel immunotherapies can enhance anti-tumor immune responses, but few children have benefited, and markers of effective responses are lacking. Here, we present a systems-level analysis of immune responses in 191 children within a population-based cohort with diverse tumors and reveal that age and tumor type shape immune responses differently.

Systemic inflammation and cytotoxic T cell responses correlate with tumor mutation rates and immune cell infiltration. Clonally expanded T cell responses are rarely detected in blood or tumors at diagnosis but are sometimes elicited during treatment. Expanded T cells are similarly regulated in children and adults with more immunogenic cancers.

This research aims to facilitate the development of precision immunotherapies for children with cancer.

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Innovation in trial design and delivery to accelerate improved outcomes for cancers in children and young people

An overview of the advances and ongoing challenges in the design and delivery of clinical trials for childhood and adolescent cancers Clinical trial designs and delivery need to modernise to incorporate innovations in clinical trial methodology to accelerate translation of scientific advances into accessible new and effective therapies.

Clinical trial research is our principal tool to drive improvements in outcomes and quality of life for children and adolescents with cancer. Every child and young person participating in a clinical trial is a unique and valuable source of data and it is crucial that clinical trial methodology maximises the information available from every participant.

Approaches to implementation of efficient statistical designs to answer the research question in the fewest number of patients (for example platform and adaptive designs), development of streamlined delivery processes for international collaborations that enable trial delivery at pace and multistakeholder partnerships with patient advocates and the pharmaceutical industry, with regulatory engagement with lessons learned from collaborative trial networks building sustainable trial infrastructures to improve outcomes for children and young people with cancer.

Author:
Pamela Kearns

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Our presence extends well beyond the labs as our innovations touch individuals around the world. Together, we impact life and health with science.

Selected speakers' abstracts

Drugging the undruggable target: Gemcitabine and cytarabine kill Ewing sarcoma cells through inhibition of SAMHD1 and degradation of the Ewing sarcoma fusion protein

Aims:
Ewing sarcoma (ES) is an aggressive paediatric bone tumour driven by EWS fusion proteins. Cytarabine has been shown to reverse the oncogenic effects of the fusion protein in vitro and in vivo but lacked clinical efficacy in a Phase I trial. We hypothesize that the gap between preclinical success and clinical failure may be due to the cytarabine-resistance factor SAMHD1. Our aim is to investigate SAMHD1's role in cytarabine resistance in Ewing sarcoma and assess whether SAMHD1 inhibition can overcome this resistance.

Methods:
We used a cell-viability assay to evaluate the sensitivity of ES cell lines, with varying SAMHD1 expression, and SAMHD1-knockouts, to cytarabine alone and in combination with gemcitabine. Gemcitabine is a drug used for treatment of relapsed bone sarcomas and a substance that we have previously described as a SAMHD1-inhibitor. Additionally, we performed immunoblotting to investigate the depletion of the fusion protein following the combination drug treatment.

Results:
SAMHD1 expression in ES cell lines was seen to positively correlate with cytarabine resistance. Further, SAMHD1 knockout and the inhibition of SAMHD1 using gemcitabine sensitized the cell lines to cytarabine. This suggests a causal relationship between SAMHD1 and cytarabine resistance in ES. The combination of cytarabine and gemcitabine also effectively depleted the fusion protein in a dose-dependent manner.

Conclusion:
SAMHD1 expression drives cytarabine resistance in ES, and gemcitabine could overcome this resistance by inhibiting SAMHD1, enhancing degradation of the oncogenic ES fusion protein.

Next Steps: We will further validate these findings in ES mouse models to assess therapeutic potential of this combination treatment. Given the longstanding use of cytarabine and gemcitabine in paediatric oncology, this research holds the potential for a novel treatment strategy of ES that targets its hitherto undruggable cancer-driving fusion protein which could quickly be translated into a clinical trial.

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Targeting Teneurin 4 suppresses tumor growth and induces differentiation in neuroblastoma

Background:
High-risk neuroblastoma presents significant clinical challenges, and further therapeutic options are needed. Teneurins (TENM1-4) are cell adhesion molecules highly expressed during embryonal development with functions in differentiation. Somatic mutations and structural aberrations of TENM genes have been identified in neuroblastoma, yet their functional role in tumorigenesis is unclear.

Aims:
To elucidate the role of TENM4 in neuroblastoma tumorigenicity and differentiation.

Methods:
TENM4 immunohistostaining was performed in neuroblastomas. scRNA-seq data was used to map the expression of TENMs. Genetic inhibition was achieved by siRNA, CRISPR-Cas9, and inducible CRISPR-Cas13d to analyze effects on morphology, proliferation, tumorigenicity, and molecular signaling through transcriptomics. Overexpression was induced to assess phenotypic changes.

Results:
TENM4 was revealed to be highly expressed in neuroblasts compared to late neuroblasts, inversely correlating to NTRK1 expression during the developing human adrenal gland. Elevated TENM4 protein and mRNA levels were detected in high-risk and MYCN-amplified neuroblastomas and correlated with poor outcome. siRNA-mediated knockdown of TENM4 decreased proliferation in neuroblastoma cell lines. Transcriptomics analyses in TENM4-inhibited neuroblastoma cells identified key cellular processes and signaling pathways, such as induced differentiation, inhibited cell cycle progression, and mTOR signaling, as TENM4 targets. We observed a trend toward more adrenergic and less mesenchymal phenotype in the TENM4-inhibited cells. Conversely, overexpressing TENM4 neuroblastoma cells exhibited downregulated differentiation markers CRISPR-Cas9 knockout of TENM4 in SK-N-BE(2) resulted in neuronal differentiation-like morphology, impaired clonogenicity, and reduced proliferation compared to wild-type cells. TENM4 knockout cells did not form tumors when grafted into nude mice, in contrast to its wild-type counterpart. CRISPR-Cas13d-mediated TENM4 knockdown in SK-N-BE(2) caused decreased levels of TENM4 and tumorigenicity in mice bearing subcutaneous tumors compared to their controls.

Conclusion:
TENM4 is expressed in a subpopulation of neuroblastomas with MYCN-amplification and plays a significant role in neuroblastoma growth and differentiation. TENM4 is a promising therapeutic target with putative clinical significance.

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Uncovering novel treatment resistance mechanisms in acute myeloid leukemia

Despite intensive treatment, up to 40% of children with acute myeloid leukemia (AML) will relapse or be refractory to therapy. This is mainly due therapy resistance, particularly to backbone drugs such as cytarabine (ara-C) and anthracyclines. While advancing technology has made it possible to better characterize the genetic landscape of AML, gaps remain in our understanding of what drives AML therapy resistance. Further understanding these mechanisms can lead to better biomarkers and individualized therapies, ultimately improving patient survival.

We have previously characterized the enzyme SAMDH1 as a resistance factor for ara-C in primary AML. Therapy for relapsed/refractory AML is often based upon ara-C together with fludarabine in so-called FLA protocols. Our most recent work has shown that SAMHD1 mediates resistance to FLA, and inhibiting SAMHD1 with hydroxyurea (HU) can improve FLA efficacy in in vitro, in vivo, and ex vivo AML models. These findings warrant clinical trials to test the safety and efficacy of this combination in patients.

SAMHD1 has recently been shown to interact with the genome regulator cohesin. Cohesin mutations are present in a significant number of patients with AML, and over half of patients with AML in Down syndrome (ML-DS) carry cohesin mutations. Despite this, the implication of cohesin on AML therapy response and prognosis is unclear. The cohesin-related Smc5/6 complex upholds proper chromosome topology, which is perturbed by anthracyclines. We have evidence suggesting that Smc5/6 expression influences anthracycline sensitivity in pediatric AML. We plan on exploring the impact of cohesin and Smc5/6 on AML therapy response in future studies.

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LiBRA – Lithium treatment to prevent cognitive impairment after brain radiotherapy

Background:
Cognitive impairment is a frequent late complication among pediatric brain tumor survivors, particularly after brain radiotherapy. It commonly affects processing speed, working memory, and causes cognitive fatigue, thereby limiting educational, vocational, and social functioning. Preclinical studies suggest lithium exerts neuroprotective effects and may also display antitumoral properties.

Methods: LiBRA, open since 2024, is a multicenter randomized controlled trial evaluating whether 6 months of oral lithium can prevent cognitive decline compared with placebo in children treated with brain radiotherapy within the previous 4 years. Cognitive performance and neuroimaging measures are assessed longitudinally.

Results: To date, treatment tolerance has been favorable with no unexpected adverse effects. Recruitment is ongoing, and trial expansion to additional sites in Sweden, Denmark, and the UK is planned.

Conclusions: LiBRA will provide the first controlled evidence on lithium as a neuroprotective intervention in pediatric brain tumor survivors. If effective, lithium would represent a safe, inexpensive, and clinically feasible strategy to reduce longterm cognitive complications after brain radiotherapy.

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Improving pre-clinical models of radiation-induced growth plate injury

Background:
Radiotherapy, while an effective cancer treatment, can significantly damage growth plates in paediatric patients, leading to long-term skeletal complications. Current pre-clinical models do not adequately mimic the clinical scenario of radiation-induced growth plate damage. This study aims to develop and refine in vivo models that more closely replicate the direct growth plate damage caused during spinal irradiation to better understand and prevent late complications.

Methods:
We applied fractionated radiation (8 doses of 2 Gy, BED of 25.1 Gy) in a 3D arc to the mouse spine from postnatal day (P)16 or P26. Vertebrae were measured over time using CT scans, and bone growth rates were assessed with xylenol injections. Micro-CT scans were performed post-sacrifice to obtain detailed images of the vertebrae structure.

Results:
Fractionated irradiation in a 3D arc caused robust growth impairment in the mouse model in both sexes and both timepoints, with spine length changes observed in both sexes and curvature changes observed only in females. Radiation significantly reduced spine length by 2.5 mm ($p < 0.05$) and altered body
proportions (spine/femur ratio difference by 0.15 (3.5%, $p < 0.05$). Histomorphometry and molecular marker analysis confirmed the presence of radiation-induced damage. Furthermore, the model recapitulated bone pathologies reflected in reduced trabecular thickness and altered micro-architecture, post-irradiation.

Conclusion:
The combination of fractionated and 3D arc irradiation provides a more clinically relevant model for studying radiation-induced growth plate damage, which can be used to better develop strategies to mitigate skeletal late effects in paediatric cancer patients undergoing radiotherapy.

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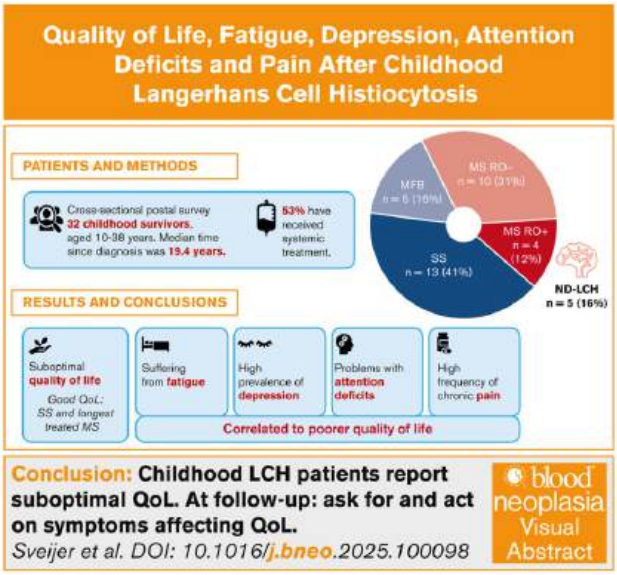
Reduced Quality of Life after Childhood Langerhans Cell Histiocytosis: Can we make a change?



Background:
Langerhans cell histiocytosis (LCH) is an inflammatory myeloid neoplasia with variable clinical presentation, from self-healing single lesions to multisystem potentially fatal disease. Long-term consequences, including progressive CNS neurodegeneration, are common.

Methods:
In this cross-sectional postal survey, we investigated how LCH affects long-term everyday life. All individuals ≥10 years diagnosed with LCH in childhood ≥5 years ago in Stockholm during 1990–2014 were invited to participate.

Results:
Thirty-two of 61 eligible individuals (52%) answered questionnaires assessing health-related quality-of-life (HRQOL), fatigue, pain, depression, and attention deficits. Their median post-diagnosis time was 19.4 years. Overall, 14/32 (44%) had had multisystem disease, including four (12.5%) with risk organ involvement, and 17/32 (53%) had received systemic treatment. Five (16%) had CNS involvement, all with neurodegeneration. Mean total HRQOL score was 78.8 and mean total fatigue score 68.7 (Pediatric Quality of Life Inventory). Five (16%) reported a diagnosed neurodevelopmental disorder. In patients ≥15 years, 42% reported long-lasting pain and 27% had scores indicating depression. Poorer HRQOL correlated with fatigue and symptoms of depression and attention deficits. Patients with single system disease and patients with multisystem disease with the longest duration of systemic treatment reported best HRQOL.

Conclusion:
We conclude that patients with childhood LCH report high frequencies of fatigue, long-lasting pain, and symptoms of depression and attention deficit in the long-term, which are associated with poorer quality-of-life and should be evaluated at follow-up. We also raise the question if longer treatment may reduce long-term consequences and have a positive impact on perceived quality of life.

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Patient and parent participation in clinical ethics support services in pediatric cancer care – an emerging moral dilemma

Background:
There is an ongoing controversy about patient and parent participation (PPP) in Clinical Ethics Support Services (CESS). To better understand PPP in CESS, it is essential to explore the viewpoints of stakeholders and the context in which they operate. The purpose of this study was to explore perceptions of PPP in CESS in pediatric cancer care.

Methods:
A total of 26 Nordic ethics support personnel (ESP) working in pediatric cancer care or general pediatrics participated in six focus group interviews. Data was analyzed with qualitative inductive content analysis.

Results:
Most ESP had no prior experience of PPP in CESS. The ESP expressed potential benefits with PPP, but these were outweighed by concerns about the risk of causing harm to participants. The perceived benefits and risks included deepening understanding and trust, creating dilemmas of decision-making participation and catalyzing confrontation. To address these challenges, the ESP suggested strategies on different levels.

Conclusions:
Despite recognizing potential benefits of PPP in CESS, ESP were primarily concerned about the risk of causing harm to participants and wanted to protect children and parents; This stance could be interpreted as a form of disguised paternalism. PPP in CESS was seen as context-dependent, and when feasible, tailoring participation and applying the suggested risk-reducing strategies were considered key. This study contributes to a deeper understanding of PPP in CESS from the perspective of ESP in pediatric cancer care and offers insights into what is needed to foster such participation in a careful way.

This findings in this abstract have previously been published: Billstein, I., Bartholdson, C., Castor, A., Molewijk, B., Pergert, P. Ethics support personnel's perceptions of patient and parent participation in clinical ethics support services in pediatric oncology. BMC Med Ethics 26, 104 (2025).

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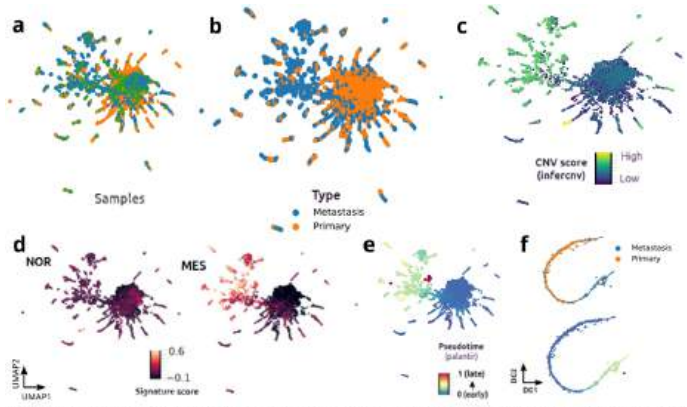
Posters’ abstracts

From Primary Tumors to Metastases: A Single-Cell Perspective on High-Risk Neuroblastoma Evolution



(a) Single cells from paired samples, broadly segregate by their origin: primary tumor versus metastasis (b). (c-d) Cells from metastases exhibit both mesenchymal (MES) and noradrenergic (NOR) gene signatures and more CNVs compared to those from primary tumors. (e) In a pseudotime reconstruction, cells in the primary tumors precede those in the metastases (f).

Background:
Neuroblastoma (NB) is a highly heterogeneous disease with a broad range of outcomes and prognoses. Understanding the cellular and molecular transitions from primary tumors to metastasis can support the design of targeted and less toxic therapeutic strategies. This study aimed to identify the cell of origin of metastasis in high-risk neuroblastoma and to reconstruct the molecular changes accompanying the progression from primary tumors to metastasis.

Aims: To address these objectives, we obtained and sequenced single cells from paired samples, including primary and metastatic tumors from three different patients.

Methods:
Using Smart-Seq3, we sequenced approximately 9,000 live, high-quality cells sorted with specific markers. Quality control measures ensured reliable gene expression profiling. Data integration with batch correction was performed, followed by cluster annotation. Myeloid cell signatures were used as reference points for malignant cluster identification. Cells were clustered and analyzed based on transcriptional profiles.

Results:
Our analysis revealed that different cell clusters exhibited varying degrees of similarity to the developing sympathoadrenal system, presenting adrenergic and mesenchymal-like signatures. Neuroendocrine cells most closely resembled noradrenergic neuroblastoma cells. The transcriptional profiles of metastatic cells indicated heterogeneous transitions, including dynamic NOR-to-MES shifts, which may contribute to metastasis. Signature scores and pseudotime reconstructions were used to track transcriptional changes over time.

Conclusion:
This study provides a comprehensive view of the evolution of high-risk neuroblastoma cells from primary tumors to metastasis. The findings highlight the heterogeneity of neuroblastoma and the importance of adrenergic and mesenchymal-like transcriptional signatures in metastasis, offering valuable insights for future targeted therapies.

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CKB HOPE – Studies for children and adolescents with cancer in Sweden and the Nordic countries

Background:
Clinical trials are an important part of improving survival and reducing side effects of cancer treatments. CKB HOPE (Center for Paediatric Clinical Studies - Haemato-oncological paediatric trial unit) conduct clinical trials phase I/II,II,III, non-interventional studies and quality registries in the Swedish Childhood Cancer Registry for all different childhood cancers. We accept patients from all Sweden but also within the Nordic region.

This to providing children and young adolescents with cancer access to safe novel therapies for improved survival and quality of life

Methods:
Allocated resources and staff who are trained in pediatric oncology and the specific area of conducting clinical trials. Also, through a European collaboration within the ITCC (Innovative Therapies for children and adolescents with cancer) new forms of treatment are prioritised and developed that can be tested.

Results:
At CKB HOPE we have 11 research nurses, 1,5 post for paediatric oncologists, 1 assistant nurse, and a start-up team of 2 study coordinators.

HOPE is continuing to develop the unit by expanding the team to facilitate the opening of additional studies. In 2024, 15 new studies were opened at CKB HOPE, including 9 clinical trials, phase I/II, II, and III, and 6 non-trials.

Conclusion:
The clinical trial unit CKB HOPE enable more paediatric patients with relapsed or refractory cancer to be included in early phase trials.

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Will my child survive? Voices of parents to a severely ill child and a healthy sibling as stem cell donor

Background and aims:
When the potential stem cell donor to an ill child is a healthy sibling below the age of 18 years, Swedish parents have the legal right and obligation to decide on behalf of the donor. However, parents have conflicting loyalty with one severely ill child and one healthy child. This study aimed to explore parents' experience during the donation and transplantation process.

Methods:
Individual interviews were performed with 18 parents of 13 minor donors, after successful paediatric stem cell transplantations. The interviews were analysed using qualitative content analysis.

Results:
Parents were *Living with the unbearable threat of losing a child* when their ill child needed a HSCT. In this situation the parents were *Focusing on the best for the ill child*, and this meant that they had their focus on the ill child; as the parents were informed that the sibling was the preferred donor, this made it obvious that the healthy child should donate stem cells. The parents were *Living with an unreliable future* which describes how they received life-changing information and needed to gain control, but still the most important information regarding whether the ill child would survive or not, left them in a state of uncertainty. To cope with this, they keep their focus on the bright moments. Finally, the parents were *Handling the family and life amid the chaos*, which included a feeling of inadequacy amid the chaos while the family became a fragmented team during hospitalizations.

Conclusion:
When parents' healthy child is a potential donor to their severely ill child, parents focus on cure for the ill child and struggle to manage the family life in the midst of a chaos. Furthermore, they feel no conflicting loyalties for their children, and this highlights the need for a separate advocate for the healthy donor. A possible limitation is that some transplants were performed before and some after Jacie accreditation.

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Is there a choice when a sibling is ill? Experiences of children and adolescents who donated stem cells to a sibling

Background:
When healthy children/adolescents are potential stem cell donors to a sibling, ethical questions arise due to their growing autonomy and the dependency on their parents. There are no Nordic studies on minor donors' experiences. This study aimed to explore the experiences of children/adolescents in Sweden who donated stem cells to a severely ill sibling.

Methods:
Interviews with thirteen donors, aged 6-17 years at the time of the donation, all with surviving siblings. The interviews were analysed using qualitative content analysis.

Results:
The main category in this study was *The presumed 'choice' when a sibling is ill*. The experience included being *Proud without an actual choice*, highlights that the donors were proud to contribute, and perceptions of a request without a choice. Focusing on the ill sibling and the outcomes reveals that they were worried and protected the sibling and downplayed the importance of their own effort. They experienced a *Need of support and information*, which derived from receiving information without communication about what they really needed to know, but also the importance of support through play and talk.

Conclusion:
Children/adolescents with a seriously ill sibling have no real choice when their stem cells match for donation and the lack of information about possible alternatives indicate that there was no option to decline. Nevertheless, the donors describe the experience as positive, enabling them to contribute to the care of the ill sibling and implying an opportunity to bring the family back together. The donors need adapted information and options to enable involvement in decision-making. Because some of the results were related to the positive outcome for the ill sibling, research is needed when the outcomes were undesirable.

Conclusions: When parents' healthy child is a potential donor to their severely ill child, parents focus on cure for the ill child and struggle to manage the family life in the midst of a chaos. Furthermore, they feel no conflicting loyalties for their children, and this highlights the need for a separate advocate for the healthy donor. A possible limitation is that some transplants were performed before and some after Jacie accreditation.

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Balancing technology and nursing care in paediatric practice – Registered Nurses' experiences of XR distraction being used during needle-related procedures

Background:
Needle-related procedures often cause considerable distress for children and present ethical challenges for nurses, who may feel uncertain about what is in the child's best interests. Distraction techniques are commonly employed to alleviate procedural distress. Technologies such as virtual and augmented reality—collectively referred to as extended reality (XR)—have demonstrated effectiveness in reducing procedural pain and anxiety. This study aimed to explore nurses' experiences of using XR-based distraction during needle-related procedures with children.

Methods:
A mixed-methods approach was adopted. Descriptive statistics were applied to survey and observational data, while reflexive thematic analysis was used to identify patterns within qualitative interview data concerning nurses' experiences.

Results:
Nurses expressed positive views regarding the use of XR distraction, perceiving it also beneficial for other children undergoing similar procedures. Two main themes emerged: "An altered work situation" captured the shift in nurse–child interaction and a movement towards more procedure-focused care, while "A favourable situation for children" reflected the value of XR as a supportive tool in paediatric settings.

Conclusion:
The integration of XR presented both opportunities and challenges. Nurses reported that XR could reduce children's fear and distress, making procedures smoother and less stressful. However, its use also changed the dynamics of nurse–child interaction, potentially shifting focus from child-centred to procedure-centred care. To embed XR effectively, it is vital to balance technological benefits with the human connection, ensuring that children's emotional and psychological needs are met alongside their physical care.

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The rehabilitation including structured active play (RePlay) model: A conceptual model for organizing physical rehabilitation sessions based on structured active play for preschoolers with cancer

Background and aim:
Preschool children with cancer experience treatment-related physical side effects, including disruptions in gross motor function, which are essential for physical activity and general development throughout early childhood. Specific rehabilitation initiatives for preschoolers diagnosed with cancer are needed to promote physical activity and development. This paper introduces a conceptual model—The RePlay (Rehabilitation including structured active play) Model—for organizing physical rehabilitation sessions based on structured active play for preschoolers with cancer.

Methods: The theory and empirically based model combine knowledge of early childhood development, play, physical activity, rehabilitation for children with cancer, and cancer treatment.

Results: With this model, we propose how to structure rehabilitation sessions, including goal-oriented, age-sensitive, fun movement activities that facilitate preschoolers to develop gross motor skills while enhancing their social and personal skills, through four core principles: (1) ritual practices which creates familiarity and routine, (2) reinforcement of movement through repetition to ensure sustainability of and confidence in movement, (3) development through appropriate challenge to evoke motivation and development, and (4) adjusting activities to accommodate treatment-related side effects to ensure participation. To further accommodate the fluctuating daily well-being of the children, the model is proportionate in time and relative in challenge.

Conclusion: This model was developed for the RePlay randomized controlled trial and holds promise for use with preschoolers diagnosed with cancer, as it is scalable and pragmatic, and accounts for the children's fluctuating physical capacity and daily wellbeing during cancer treatment.practices that connect everyday contexts and respect individual boundaries.

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Uncovering novel treatment resistance mechanisms in acute myeloid leukemia

Despite intensive treatment, up to 40% of children with acute myeloid leukemia (AML) will relapse or be refractory to therapy. This is mainly due therapy resistance, particularly to backbone drugs such as cytarabine (ara-C) and anthracyclines. While advancing technology has made it possible to better characterize the genetic landscape of AML, gaps remain in our understanding of what drives AML therapy resistance. Further understanding these mechanisms can lead to better biomarkers and individualized therapies, ultimately improving patient survival.

We have previously characterized the enzyme SAMDH1 as a resistance factor for ara-C in primary AML. Therapy for relapsed/refractory AML is often based upon ara-C together with fludarabine in so-called FLA protocols. Our most recent work has shown that SAMHD1 mediates resistance to FLA, and inhibiting SAMHD1 with hydroxyurea (HU) can improve FLA efficacy in in vitro, in vivo, and ex vivo AML models. These findings warrant clinical trials to test the safety and efficacy of this combination in patients.

SAMHD1 has recently been shown to interact with the genome regulator cohesin. Cohesin mutations are present in a significant number of patients with AML, and over half of patients with AML in Down syndrome (ML-DS) carry cohesin mutations. Despite this, the implication of cohesin on AML therapy response and prognosis is unclear. The cohesin-related Smc5/6 complex upholds proper chromosome topology, which is perturbed by anthracyclines. We have evidence suggesting that Smc5/6 expression influences anthracycline sensitivity in pediatric AML. We plan on exploring the impact of cohesin and Smc5/6 on AML therapy response in future studies.

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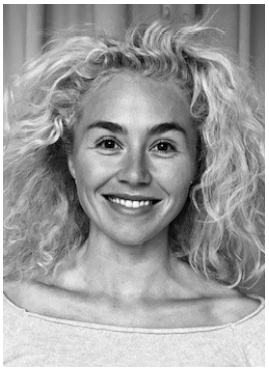
Supporting siblings of children with cancer – an interdisciplinary study on care, inclusion, and psychosocial intervention

Background and aim:
Siblings of children with cancer experience disruptions to daily life, emotional strain, and social and academic challenges, yet they remain largely overlooked in family-centered pediatric care. This study aimed to 1) explore siblings' challenges across everyday contexts, 2) co-design an intervention to address these challenges, and 3) examine siblings' and parents' perceptions of its impact.

Methods: Using an action research framework, we conducted participant observations, semi-structured interviews, including co-creation elements, with siblings and parents of children with cancer (aged 0–18).

Results: Siblings face complex challenges at home, in hospitals, and in schools. They often occupy a peripheral position in the family's cancer experience, with limited access to information and opportunities for involvement. Structural barriers in healthcare and limited knowledge in schools reinforce this peripheral position. In collaboration with siblings and parents, we developed the SUPREME intervention, including two meetings with a hospital-based nurse followed by educational sessions in the sibling's classroom, covering childhood cancer, treatment, and the sibling experience. Delivered by a trusted professional in familiar settings, the intervention promoted inclusion, strengthened peer understanding, and restored a sense of normality. It emerged as a flexible, context-sensitive model bridging home, school, and hospital.

Conclusion: This study advances understanding of siblings' psychosocial challenges and demonstrates the value of structured, cross-institutional interventions. The SUPREME model responds to siblings' needs for early, age-appropriate information and emotional support, highlighting the importance of flexible care practices that connect everyday contexts and respect individual boundaries.



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Novel drug combinations exploit metabolic vulnerabilities in neuroblastoma

Background:
Neuroblastomas frequently harbor mutations in genes associated with neuritogenesis and Rho/Rac signaling and we have previously established Rho/ROCK signaling as a promising therapeutic target. This project aims to improve survival and reduce adverse effects in children with neuroblastoma by exploring the combinatorial potential of KD025 (Belumosudil, Rezurock™), a ROCK2-specific inhibitor.

Methods:
Drug combination screening was performed using KD025 together with a cancer drug library containing 528 drugs. IncuCyte® LiveCell analysis was used to assess tumor growth and cell death in neuroblastoma monolayer cultures and tumor spheroids. Additionally, Seahorse XF extracellular flux analyzer, nutrient deprivation experiments, and glucose uptake assays were used to investigate metabolic changes. In vivo efficacy was evaluated using 9464D allografts and homozygous TH-MYCN mice. RNA-sequencing and gene set enrichment analysis were applied to study transcriptomics.

Results:
Monotherapy with KD025 impaired growth of neuroblastoma cell lines, 9464D allografts, and tumors in homozygous TH-MYCN mice but did not achieve a complete response. Notably, RNA-sequencing of KD025-treated tumors demonstrated downregulation of genes associated with metabolic processes. A drug combination screening revealed several combination partners for KD025 with known metabolic effects (e.g. TIC10 and NMS-873) and synergistic effects were confirmed in various neuroblastoma models. We observed that TIC10 and NMS-873 inhibited oxidative phosphorylation (OXPHOS) and upregulated glycolysis. However, addition of KD025 reduced glucose uptake and prevented the increase in glycolysis induced by OXPHOS inhibition.

Conclusion:
Combining KD025 with OXPHOS-targeting drugs provides a promising therapeutic approach as these combinations target neuroblastoma cell metabolism from different angles resulting in robust synergistic effects.

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Evaluation of targeting impdh to inhibit samhd1 in kmt2a-rearranged leukemia

Patients with KMT2A-rearranged (KMT2Ar) acute lymphoblastic leukemia (ALL) or acute myeloid leukemia (AML) have high rates of drug resistance and poor prognosis. SAMHD1 is a resistance factor for leukemic backbone drugs cytarabine (ara-C) and nelarabine (ara-G). Through a phenotypic screen, we identified ribonucleotide reductase inhibitors that resensitize leukemic cells to ara-C via allosteric inhibition of SAMHD1. In the same screen, we identified the IMPDH inhibitor mycophenolic acid (MPA) as a potential SAMHD1 inhibitor, which has recently been shown to effectively kill KMT2Ar AML cells.

Here, we characterised the effect of IMPDH inhibition together with ara-C or ara-G in leukemic cell lines using KMT2Ar and non-KMT2Ar SAMHD1-proficient or SAMHD1-deficient cells and iPSCs. Cell viability was measured using an ATP-based viability assay, and dose-response curves were generated with GraphPad Prism and synergy measured using SynergyFinder. We found that MPA synergised with ara-C in AML cell lines in a SAMHD1-dependent manner, but did not influence ara-G efficacy in ALL cells. We also tested other IMPDH inhibitors and found that ribavirin showed significant SAMHD1-dependent synergy with ara-C. Notably, KMT2A status did not predict response to any single IMPDH inhibitor, and synergy was observed only in AML models.

Accumulation of ara-CTP, the active metabolite of ara-C, is key for ara-C's antileukemic effect. To assess the impact of IMPDH inhibition on ara-CTP and dNTP levels, we measured these metabolites using HPLC-MS/MS in cells treated with MPA, ara-C/ara-G, or the combination. These results will be presented here.

In conclusion, IMPDH inhibition alone is cytotoxic across leukemia cell lines, regardless of KMT2A status. Interestingly, IMPDH inhibitors enhanced the effect of ara-C but not ara-G, suggesting a different underlying mechanism. Given their antileukemic activity, IMPDH inhibitors could be considered as a potential treatment option, either alone or in combination with ara-C, particularly for leukemia patients requiring immunosuppressive therapy.

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Inhibition of ROCK2 offers a novel approach to target metastatic spread in neuroblastoma

Background:
Neuroblastoma displays a high rate of metastases, often already at diagnosis. Consequently, new therapeutic agents that can control both tumor growth and metastasis, are urgently needed. We have previously demonstrated that targeting the Rho/ROCK-signaling axis is an attractive therapeutic approach in neuroblastoma. Functions of Rho/ROCK signaling in cytoskeletal remodeling and actin dynamics are well established and various processes associated with metastatic spread depend on ROCK.

Aims: This work aims to investigate the effects of KD025 (Belumosudil), an FDA-approved ROCK2-specific inhibitor, on metastatic processes in neuroblastoma.

Methods: We applied in vitro migration and invasion assays using different neuroblastoma cell lines grown as monolayers and tumor spheroids utilizing the Incucyte® Live-Cell Analysis System. Additionally, the effects of KD025 under hypoxia were assessed.

Results: Our results demonstrated that KD025 more potently impaired neuroblastoma growth under hypoxic conditions than normoxia. Furthermore, KD025 reduced neuroblastoma cell migration and blocked cell invasion in neuroblastoma cell lines grown in monolayer. Moreover, KD025 suppressed 3D tumor cell invasion into a Matrigel matrix in a neuroblastoma spheroid model, in a dose-dependent manner.
Our findings form the basis for further studies investigating the effects of KD025 on neuroblastoma metastasis in vivo.

Conclusion: High-risk neuroblastoma patients have a high frequency of metastatic disease and hypoxia is an important environmental stressor contributing to metastatic tumor progression. Our results propose that inhibition of ROCK2 can target tumor growth and invasive capacity in neuroblastoma, especially under hypoxic conditions. Thus, inhibition of Rho/ROCK signaling may offer a promising treatment approach to target metastatic spread in neuroblastoma.

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Assessment of Intrathecal Therapy in the Treatment of Familial Hemophagocytic Lymphohistiocytosis

Background and aim:
Aim:
In familial hemophagocytic lymphohistiocytosis (FHL), CNS involvement with neurological alterations and/or cerebrospinal fluid (CSF) pleocytosis or elevated protein is frequent at diagnosis. We assessed intrathecal (IT) methotrexate with/without corticosteroids for CNS involvement in FHL. Methods: We retrospectively evaluated all 78 non-transplanted FHL-children (<18 years) in the HLH-2004 study alive after 2 months with data on IT therapy (indicated after 2 weeks in case of progressive neurological symptoms or non-improved abnormal CSF) and verified CNS involvement at onset; 42/78 (54%) had neurological alterations and 61/67 (91%; nd=11) abnormal

CSF. Results:
IT therapy was administered to 37/78 (47%) with CNS involvement at onset ("IT-patients"). After 2 months, 27/74 (36%, nd=4) had neurological alterations, of whom 7 had no alterations at onset; 4/13 (31%) IT-patients and 3/22 (14%) non-IT-patients (p=0.38). Further, 8/21 (38%) IT-patients improved from having neurological alterations at onset to no alterations, compared to 11/18 (61%) non-IT-patients (nd=3) (p=0.20).

The seemingly limited response of IT therapy could not be explained by less systemic therapy nor more severe visceral disease. However, undetected differences between the groups cannot be excluded. Conclusion: The results suggest limited effectiveness of IT therapy, highlighting needs for studies to establish data-driven recommendations for its use in FHL.

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Childhood cancer patient-specific stem cells to restore lost germline and study effects of cancer therapy.

Background:
Advances in childhood cancer treatments have led to five-year survival rates above 80% in Sweden. However, most survivors face long-term treatment side effects, including infertility. For prepubertal boys at high risk of infertility, the cryopreservation of testicular tissue containing viable spermatogonial stem cells (SSCs) offers a potential avenue for future auto-transplantation or in vitro differentiation. Nevertheless, in patients lacking SSCs or with severely compromised SSC populations, the only solution to restore fertility relies on generating induced pluripotent stem cells (hiPSCs) and subsequent germline differentiation. Accordingly, this project aimed to generate hiPSC lines from testicular samples of childhood cancer survivors and differentiate them into nascent male germ cells.

Methods:
Primary testicular somatic cells were isolated, expanded, and reprogrammed into hiPSCs using an mRNA-based approach. The resulting hiPSC lines were validated by molecular karyotyping, expression of pluripotency markers (OCT4 and SOX2), and trilineage differentiation competence. Furthermore, human primordial germ cell-like cells (hPGCLCs) were specified using an embryoid body-based protocol.

Results:
We generated hiPSCs from three childhood cancer patients with severe SSC depletion. These hiPSC lines had a normal karyotype, expressed pluripotency markers, and successfully differentiated to the three germ layers. Importantly, all hiPSC lines were competent for naïve pluripotency conversion and successfully specified hPGCLCs, as verified by FACS and immunohistochemistry.

Conclusion:
This study demonstrates the feasibility of using cryopreserved testicular samples from childhood cancer survivors with severe SSC depletion to generate hiPSCs and differentiate them into nascent male germ cells, laying the preclinical foundation for restoring fertility in adulthood. Additionally, deriving hiPSCs from chemotherapy-exposed somatic cells will allow further investigation into the impact of cancer therapies on cellular function.

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The quantity and quality of humoral immunity against sars-cov-2 in children with cancer and hematological diseases

Background:
Our understanding of protective immunity after natural viral infections in children with cancer and hematological diseases is restricted, despite their susceptibility to infections. Current cancer treatments cause significant immunosuppression, affecting both innate and adaptive immunity which leads to reduced B-cell and antibody responses, increasing vulnerability to re-infections and poor vaccines reactions. The aim of this study was to characterize SARS-CoV-2 immune response in children with cancer or severe hematological disease.

Methods:
A single-center longitudinal study was conducted from June 2020 to June 2023, including 135 patients and 14 healthy siblings. Blood samples were obtained for serological analysis, including SARS-CoV-2 antibodies quantification using suspension immunoassay (SIA) and enzyme-linked immunosorbent assay (ELISA). Neutralizing antibody responses were assessed by plaque reduction neutralization tests (PRNT), and both memory B-cell population and responses were evaluated through Flow Cytometry and FluoroSpot using peripheral blood mononuclear cells (PBMCs), respectively.

Results:
Total immunoglobulin levels were lower in patients with severe immunosuppression, reflecting the expected impact of treatment on the B-cell compartment. Among seropositive patients (n = 78), seroconversion in response to SARS-CoV-2 was not significantly affected neither by immunosuppression nor cancer diagnosis. SARS-CoV-2-specific IgG and IgA levels correlated positively with increasing age, and IgA seroconversion was significantly associated with the presence of NAbs. Antigen-specific memory B-cell responses against both Spike and receptor-binding domain (RBD) were greater in older children, while immunosuppression negatively affected RBD IgG levels.

Conclusion:
Most pediatric oncology and hematology patients had detectable antibody responses to SARS-CoV-2, regardless of treatment-induced immunosuppression. However, memory B-cell responses seem to be impaired, particularly for RBD-specific immunity. Overall, age played a key role in immune response development, highlighting the need for further research into immune protection and vaccine strategies in young patients.

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Autophagic flux is accelerated in the acute stages of radiation-induced growth plate injury

Background:
Radiotherapy during childhood and adolescence commonly leads to skeletal late complications including short stature, limb length-discrepancy, and scoliosis/kyphosis in pediatric oncology patients. Irradiation causes such late complications by directly damaging growth plates, cartilage organs that elongate bones via endochondral ossification. While understanding the acute responses by growth plates to irradiation could reveal strategies to prevent or reduce the severity of skeletal late complications, these responses are yet to be fully described.

Methods:
Here, we established an in vivo model of focal growth plate irradiation that recapitulates the clinical development of skeletal late complications and used it to explore the responses of growth plate chondrocytes within the first 72 hours of radiation exposure. We combined this with rare human growth plate biopsies exposed to ionizing radiation ex vivo to monitor acute effects of radiation exposure on human chondrocytes. Using these approaches, we applied clonal genetic tracing and immunofluorescence to monitor changes at the cellular and molecular levels.

Results:
Growth plate irradiation disrupts the continuous production of chondrocytes required for bone elongation and is associated with DNA damage throughout the growth plate. Indicators of growth plate activity, SOX9 and the phosphorylated form of ribosomal protein S6, decreased during a 6- and 24-hour post-irradiation window but returned to normal levels 72 hours after irradiation. We identified a surge in autophagic flux throughout the growth plate during this window, based on temporal SQSTM1 and LAMP1 protein levels. The earliest stages of these response mechanisms are conserved between species and relevant to humans.

Conclusion:
Our results demonstrate that a rapid elevation in autophagic flux is an acute response to irradiation in growth plate chondrocytes, revealing novel potential therapeutic targets for preventing radiation-induced skeletal late-complications.

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Children’s experience of pain when a needle isinserted in a subcutaneous venous port

Background:
Painful medical procedures is common within oncology for children. Every daychildren endure pain in connection with needle related procedures, such as when a needle isput in the subcutaneous venous port (SVP). It is a challenge for pediatric nurses to giveadequate pain relief to the children. So far Emla® is the most commonly used pain relief.According to several clinical studies cold and vibratory stimulation has been used as painrelief with good results. To ensure effective pain relief with the use of cold and vibratorystimulation it is important to have knowledge about how the sensory nerve fibers are locatedin dermatomes, the theory of Gate control.

Purpose:
The aim of the study was to comparetwo different kinds of pain relief when putting a needle in a subcutaneous venous port.

Methods:
A mixed method was used. The quantitative part is experimental, and the qualitativepart includes one question and observations.

Results:
Participants were a total of 30 1-18-year-old children. A total of 83% reported that it was a different feeling when Buzzy Bee® wasused as pain relief compared to the use of Emla®. Fifty seven percent chose to proceed withBuzzy Bee®.

Conclusion:
ain is an individual experience and this study indicates that it canbe difficult to tell the difference between pain, fear and anxiety. The findings show that BuzzyBee® is a good alternative to Emla®.

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Bus
Bus 57 stops near the hotel at the Vanadisplan stop. The hotel is 200 meters from the stop.

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