AALBORG
UNIVERSITY HOSPITAL

Annual Report 2024

Department of Haematology
Research Section

CONTENT

1 Research Strategy

The Haematology Research Section is an integrated part of Department of Haematology at Aalborg University Hospital. In accordance with the overall research strategy and the Danish Health Act, the clinical practice is based on evidence and development in relation to new diagnostics, therapy and follow up. The Haematology Research Section contributes to advances within all these aspects by interdisciplinary, clinically need-driven research by advanced epidemiology, medical statistics, cellular model systems, and recently also the novel research field of exhaled breath-omics. We have a long and strong tradition for combining research fields both within the Haematology Research Section, Aalborg University Hospital, Aalborg University as well as with other national and international experts from various disciplines.

Mission

Our mission is to ensure optimal diagnostics, treatment, and care for patients with haematological diseases in the North Denmark Region and furthermore to create a good working environment making Department of Haematology an attractive and inspiring place to work.

Vision and Goals

We aim to

- Analyse real-world data to monitor diagnostics, treatment, and survival of haematological diseases and their complications by means of cancer epidemiological research methods
  - Explore the spatial distribution of haematological cancers in Denmark to identify hotspots for further studies on environmental risk factors
  - Understand the relation between venous thromboses and cancer diseases and develop algorithms to identify patients at risk of thrombosis prophylaxis
  - Investigate late toxicities after haematological cancer treatment
  - Socioeconomic equality in treatment availability
  - Investigate complications and effect of treatment in a real-world-setting
- Implement and run investigator-initiated clinical trials
  - Phase I-IV studies
  - Investigate the biology of rare haematological cancers
- Understand the mechanisms behind disease pathogenesis and resistance to treatment of blood diseases
  - Personalised medicine and tumour cell biology
  - Preclinical models, methods, and tools for assignment of individual drug resistance of haematological cancer
  - Omics-based studies

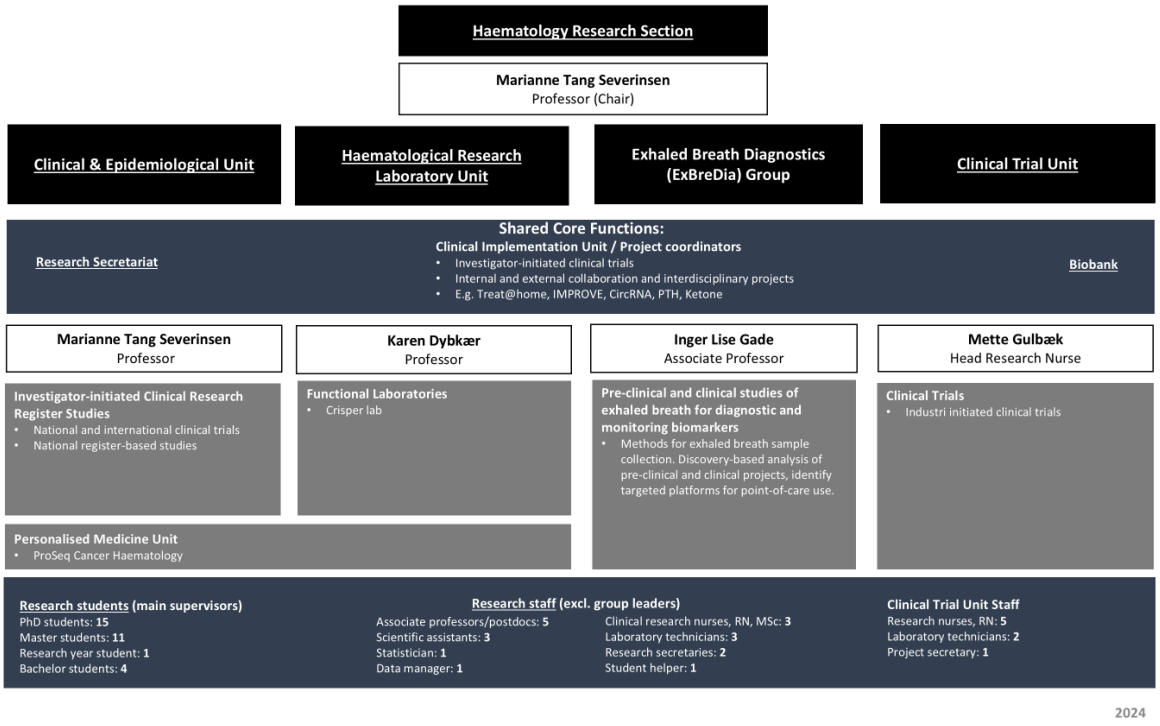
- Investigate the exhaled breath's composition of non-volatile organic compounds
  - Identify biomarkers to transform non-invasive point-of-care diagnostics and monitoring
  - Device development at the point-of-care
- Conduct nurse-led research
  - Develop new and less resource-demanding methods for follow-up of patients treated for blood diseases
  - Develop homebased treatment algorithms
- Be an attractive partner for the pharmaceutical industry regarding industry-initiated clinical trials so that new and experimental treatments may be developed and offered to patients with haematological diseases
- Attract researchers and clinicians from other regions and universities
- Inspire and attract students and young scientists to do research in haematology

2 Research Infrastructures

Organisation

The research section at Department of Haematology, Aalborg University Hospital, was established in 2005, now including clinical research, epidemiology, laboratories, and a secretariat.

Figure 1 | Organisation plan for 2024



Professorship Responsibilities

Chair professor Marianne Tang Severinsen

We will attain our mission by bridging research and clinical work which is the overarching goal. The research section is organised as a unit within the Department of Haematology. The professor and head of research holds a chair at the faculty/Department of Clinical Medicine and works parttime as a consultant haematologist at the clinical department. Furthermore, the professorship involves being responsible for the education of medical students within the field of haematology. The aim is to engage medical doctors and students to do research, but also to

give researchers within other fields an insight into the “real world” seen from a patient-doctor perspective.

Personalised Medicine Unit

Professors Marianne Tang Severinsen & Karen Dybkær

The Personalised Medicine Unit conducts translational, interdisciplinary research combining clinical and molecular biology laboratory research. The main focus is to provide access to genetic profiling of tumour cells for patients with advanced or clinically unusual haematologic cancer diagnoses in order to support individually guided targeted treatment options. With invaluable help from the Clinical Implementation Unit candidate patients receive information on the ProSeq project, informed consent is collected, and relevant biological material necessary for genetic profiling is collected. The Personalised Medicine Unit collaborates with Department of Molecular Diagnostics and Department of Oncology, Aalborg UH, on personalised medicine as an operational function at Aalborg University Hospital. Results from the completed molecular genetic studies are evaluated by specialists and placed in a clinical and literature context and the results are presented and discussed at local and national tumour conferences (MDTs).

Haematological Research Laboratory Unit

Professor Karen Dybkær

The Haematological Research Laboratory Unit has focus on molecular analyses of haematological cancers and how to use these in combination with clinical information to identify new determinants and mechanisms that affect disease development, sensitivity to therapeutic drugs as well as disease classifications. Based on genome editing with CRISPR-Cas9 technology spanning over genome analyses, functional analyses, biobanking, and participation in prospective clinical trials, we strive towards better treatment and risk stratification of cancer patients. The projects are all based on interdisciplinarity and collaboration with local, national, and international partners. The unit works in an innovative and inspiring research environment with access to gene technology class I and II laboratories equipped with advanced flow cytometry, cell culture facilities, extraction equipment for DNA, RNA and protein from biological tissues and cells. So far eight PhD students, more than 15 master students, and 10 bachelor students have graduated with projects from the haematological research laboratory unit.

Exhaled Breath Diagnostics and Monitoring Research Group (ExBreDiMo)

Senior Registrar, PhD, Associate Professor Inger Lise Gade

The Exhaled Breath Diagnostics and Monitoring (ExBreDiMo) group is a new research group in the Haematology Research Section. The group is established and led by Inger Lise Gade envisioning to revolutionize disease diagnosis and monitoring by analysis of exhaled breath.

The ExBreDiMo group aims to understand the exhaled breath composition in healthy and diseased subjects. The group will use clinically relevant examples for the initial studies of the exhaled breath's potential as a new biological sample focusing on exhaled breath protein analysis. The group was established in 2024 with a Clinical Emerging Investigator grant from the Novo Nordisk Foundation and a recent grant from the Independent Research Council (DFF/Inge Lehman).

Besides the initial consolidation, the 2024 focus for the ExBreDiMo group was method development and testing, starting with development of equipment to sort dead-space air from exhaled breath samples in close collaboration with biomedical engineers from the Department of Health, Science and Technology at Aalborg University, and different collection devices in collaboration with several industrial partners. The group leader, Inger Lise Gade attended the International Association of Breath Research (IABR) Summit in Indianapolis where she established a formal collaboration with Professor Cristina Davis group from The Department of Mechanical and Aerospace Engineering, University of California, Davis, USA to optimize and investigate the metabolite composition in exhaled breath, preparing for multi-omics exhaled breath analysis in the next concrete projects.

A comprehensive plan for the first pre-clinical studies of stroke and method optimization in general was developed in collaboration with clinical colleagues from the Departments of Neuroradiology, Neurology and the Biomedicine Research Laboratory, all Aalborg University Hospital.

A group of five bachelor students graduated from the group in summer 2024 (with straight A's) based on data from a pilot project concerning possible pathogen detection in the exhaled breath exemplified by *Pneumocystis jirovecii* pneumonia.

Epidemiology & Real-World Evidence Unit

Professor Tarec C El-Galaly

The Epidemiology & Real-World Evidence Unit has focus on conducting high-quality and practice-changing studies in haematology using local, nationwide, or international real-world data. Strong international collaborations and core functions in national and international studies characterise this group. The group is highly experienced in conducting clinical research and implementation of results. The areas of strength, all documented by high impact publications and international collaborations, are dynamic prognostic model development, implementation of decision support tools, survival statistics, real-world effectiveness of treatment interventions, efficient diagnostic work-up and disease surveillance in haematology and late toxicities. The group is multi-disciplinary with physicians and statisticians working closely together on research with clinical impact.

As of 1 August 2024, Tarec Christoffer El-Galaly continues his research work as professor at Aarhus University Hospital, Department of Haematology.

Clinical Trial Unit

Manager, Head Research Nurse Mette Gulbæk & Project Secretary Elisabeth Vilsbæk Flensted

The Clinical Trial Unit (CTU) at the Department of Haematology supports clinical research activity within the department. The unit continuously participates in clinical trials for the large haematological diseases and thereby contributes to gather new knowledge and to improve the quality of patient treatment. A large part of the activity concerns worldwide industry-initiated trials and the unit has experience with a large portfolio of studies spanning from phase 1A studies to phase 4 studies. In practice this means that the staff are already familiar with new patient treatments once they are approved for treatment, thus giving the department a priceless lead and ensuring a high-quality standard.

Our general CTU activities include screening of patients for inclusion in clinical protocols, administration of study drugs, a guarantee of high data quality, registration of data in project databases, and compliance with protocols and legislation.

Another important function of the CTU is participation in investigator-initiated studies, partly studies initiated from other departments and researchers in Denmark and partly local investigator-initiated studies. Consequently, the CTU has in recent years built up solid experience as sponsor, conducting clinical trials locally, nationally, and internationally with preparation of study protocols, applications to regulatory authorities, design of case report forms (CRFs) for registration of study data, and other sponsor responsibilities. Additionally, the CTU facilitates the conduct of other types of studies such as questionnaire studies and register studies as well as collection of biological samples, thus supporting studies originating from other units of the haematology research section.

Core Functions

Clinical Implementation Unit

Professors Marianne Tang Severinsen & Karen Dybkær

The Clinical Implementation Unit specialises in investigator-initiated phase I-IV prospective trials. This includes studies initiated from other departments and Danish hospitals. The Clinical Implementation Unit handles screening, information, and inclusion of trial subjects, obtains informed consent, creates clinical databases, and registers clinical data in the REDCap databases created for the individual projects. In addition, the Clinical Implementation Unit has a coordinating role in relation to collecting biological material, including tissue, blood, and bone marrow samples as well as collecting saliva samples, mouth scrapes and punch biopsies used as normal reference in a personalised medicine trial.

The Clinical Implementation Unit also runs projects including collection and recording of patient-reported outcome data (PRO data).

Haematological Biobank

Professor Karen Dybkær

Bone marrow and peripheral blood samples are registered in the Haematological Biobank under Bio and Genome Bank Denmark (RGBG). The Haematological Biobank collects and stores vital frozen single cell suspensions of mononuclear cells, plasma and serum from patients included in current clinical prospective protocols and health science projects, and from patients suitable for future research projects.

For current clinical prospective protocols and health science projects approved by a regional or national committee on health research ethics, a project-specific research biobank has been set up for the individual projects. For personalised medicine the Haematological Biobank usually also collects, handles, and registers biological tissue in the form of a saliva sample, mouth scrape or skin punch biopsy. Detailed standard operating procedures have been developed for sample handling and processing, ensuring fast and reproducible logistics and freezing.

Biological material from patients with haematological diagnoses is collected and stored in the haematological biobank if informed consent has been given by the patient. The sample material can be used if a future course of treatment requires additional investigations for the individual patient. Sample material can also be used in future research projects if accepted by a committee on health research ethics, given an opportunity for improving diagnostics and treatment methods for future patients is present.

Research Secretariat

Research Secretaries Anne Lindblom & Lise Tordrup Elkjær

The research secretariat coordinates and provides secretarial and administrative assistance to professors, researchers, and students at the research laboratory and epidemiology unit as well as the biobank, and the clinical implementation & PM unit.

The research secretariat performs research-related administrative tasks including

- administration of grants, research accounts and annual accounts
- preparation of budgets incl. monthly updates and financial reports
- administration of staff-related matters incl. recruitment and employment
- booking, administration and coordination of travels and conferences
- organising and taking minutes at meetings
- preparation, coordination, translation, editing, and proofreading of project descriptions, scientific papers, reports, and strategies
- submission of manuscripts for publication, applications for funding, and applications for regulatory authorities
- maintenance of office filing systems and web pages

The research secretariat takes part in a national association of research and project secretaries within oncology and haematology and participates in annual meetings.

3 Major Events

PhD Defences

PhD Defence Joachim Bæch

On Friday 2 February 2024 Joachim Bæch, MD, defended his PhD thesis with the title: ”Late toxicities in lymphoma: real-world data on cardiotoxicity, diabetes mellitus, and second malignancies”.

Supervisors: Tarec C. El-Galaly (main), Lasse Hjort Jakobsen, Henrik Frederiksen (Department of Haematology OUH), Marianne Tang Severinsen.
Assessment committee: Clinical Prof. Søren Schou Olesen, MD, PhD (chair) Aalborg University Hospital, Denmark, Senior Consultant Morten Kjøbek Lamberts, MD, PhD Herlev-Gentofte Hospital, Denmark, Prof. Sirpa Marianne Leppä, MD, PhD University of Helsinki, Finland

PhD Defence by Eva Futtrup Maksten

On 15 March 2024 Eva Futtrup Maksten, MD, defended her PhD thesis with the title: “Survivorship among patients with haematological cancer: Work disability, dementia, and neuropathy”
Supervisors: Marianne Tang Severinsen (main), Lasse Hjort Jakobsen, Tarec C. El-Galaly, Kristian Hay Kragholm (Department of Cardiology)
Assessment committee: Associate Professor Salome Kristensen (chair) Aalborg University,

Associate Professor Rune Erichsen, Aarhus University, Professor Hege Sagstuen Haugnes, Universitetssykehuset Nord-Norge

PhD Defence by Issa Ismail Issa

On 17 May 2024 Issa Ismail Issa, MSc in Biomedicine, defended his PhD thesis with the title: "Genetic determinants of drug response in diffuse large B-cell lymphoma"

Supervisors: Karen Dybkær (main), Martin Bøgsted
Assessment Committee: Clinical Professor Lone Sunde (chair) Aalborg University, Denmark Associate Professor Yumeng Mao Uppsala University, Sweden Professor Krister Wennerberg University of Copenhagen, Denmark

PhD Defence by Lars Hernández Nielsen

On 1 November 2024 Lars Hernández Nielsen, MSc in Economics, CLINDA – Center for Clinical Data Science, Aalborg University, defended his PhD thesis with the title: "Individual-based registrations of systemic anti-cancer therapy for monitoring expenditures and access to treatment".
Supervisors Rasmus Brøndum (main), Martin Bøgsted, Marianne Tang Severinsen.
Assessment committee: Professor, Jan Sørensen, Royal College of Surgeons in Ireland, Department of Clinical Medicine, Aalborg University, Professor, Bernard Rachet London School of Hygiene & Tropical Medicine, Professor, Mette Nørgaard, Department of Clinical Medicine, Aarhus University.

Best Poster Presentation Award

Issa Ismail Issa, PhD fellow**,** won a Best Poster Presentation Award at the 1st CRISPR MEDiCiNE Conference 2024, held 23-25 April 2024 in Copenhagen, Denmark, for his poster “Genome-wide CRISPR-Cas9 knockout screen identifies DNA damage response pathways and BTK as essential for cisplatin response in diffuse large B-cell lymphoma”.

Research Day at Department of Haematology

The haematology research section held their annual research day on 20 November 2024 and everybody from the research section participated. Colleagues from the clinical research unit and representatives from the department management participated as well. Students, junior researchers and senior researchers gave presentations of their research projects. The day was filled with interesting presentations and gave us an insight into what goes on in the various research groups, such as epidemiology, statistics, laboratory research, nurse-led research, personalised medicine, research in exhaled breath and vitamins.

Research Retreats at Klitgaarden, Skagen

In August 2024 the experimental laboratory unit stayed at Klitgaarden in Skagen (North Denmark Region) for a few days to work on manuscripts for scientific articles and to examine and discuss new laboratory techniques for implementation in present and future projects. Furthermore, we prepared a work plan for the following six months for each person in the group as well as for future students.

Likewise, PhD and research year students from the clinical and epidemiological unit spent three days at Klitgaarden at the beginning of December 2024 working and writing on their articles. This gave them plenty of time to concentrate on their respective research projects, get new ideas, and receive excellent and focused supervision. In addition to the writing of articles, the days were filled with many relevant panel discussions across the different research areas as well as statistical support.

Statistics Denmark Server Research Day

In August 2024, the epidemiology group participated in a research day held by Clinical Cancer Research Centre at Aalborg UH. Professor Marianne Tang Severinsen, who holds an authorisation at Statistics Denmark and is thus responsible for the server, opened and chaired the meeting. A lot of interesting research projects from several participating departments were presented.

4 Research Projects

Clinical Studies

Investigator-initiated clinical studies, conducted by the clinical implementation unit or as part of PhD projects, and industry-initiated clinical trials, conducted by the clinical trial unit, are listed below in alphabetical order. They are identified by approval ID from a regulatory authority such as CTIS/EudraCT (clinical trials), the Danish National Committee on Health Research Ethics (NVK), a local research ethics committee or a regional record of processing activities cf. GDPR Art. 30.

Table 1 | Active Clinical Studies in 2024

Study Title	Principal Investigator (PI)	Approval ID
AmbuFlex - Individualised patient follow-up	**Jakob Madsen**, MD, Department Medical Director, Department of Haematology, Aalborg UH	Not applicable; quality control project
BosuPeg - A study of efficacy and safety of long-acting low dose ropeginterferon in patients with chronic myeloid leukemia treated with bosutinib from diagnosis: a randomized prospective trial	Henrik Hjorth-Hansen, Department of Haematology, St. Olav's Hospital Trondheim, Norway. National PI DK: Andreja Dimitrijevic, Department of Haematology Odense University Hospital, Odense **Local PI: Rie Sander Bech**, Senior Registrar, Department of Haematology, Aalborg University Hospital	S-20190041
CircRNA - Identifikation af molekylære mekanismer under udvikling af resistens mod Revlimid i myelomatose	Lasse Sommer Kristensen, Associate Professor, Institute for Biomedicine, Aarhus University **Local PIs: Karen Dybkær**, Professor PhD and **Henrik Gregersen**, MD, PhD, Department of Haematology, Aalborg University Hospital	1-10-72-170-21
Cured but not well - Haematological cancer survivors' experiences of chemotherapy-induced peripheral neuropathy in everyday life: a phenomenological-hermeneutic study.	**Mette Louise Roed**, MSc in Health Science, Department of Haematology, Aalborg University Hospital	F2023-105
DELPHI - Danish Elderly Lymphoma Patient Hematopoietic Investigation	Kirsten Grønbæk, Professor, MD, DMSc, Department of Haematology, Rigshospitalet, Copenhagen **Local PI: Tarec C. El-Galaly**, Professor, MD, DMSc, Department of Haematology, Aalborg UH	H-20077410
EVI-3 - A multicenter, randomized, parallel-group, placebo-controlled phase II study of the efficacy and safety of oral vitamin C supplement in combination with azacitidine in	Kirsten Grønbæk, Professor, MD, DMSc, Department of Haematology, Rigshospitalet, Copenhagen. **Local PI: Marianne Tang Severinsen**, Professor, MD, PhD, Department of Haematology, Aalborg UH	H-18040929

Study Title	Principal Investigator (PI)	Approval ID
higher-risk MDS, CMML, and low blast-count AML		
Excaliber - A Phase 3, Randomized, Multicenter, Open-label Study Comparing Iber-domide, Daratumumab and Dexamethasone (IberDd) versus Daratumumab, Bortezomib, and Dexamethasone (DVd) in Subjects with Relapsed or Refrac-tory Multiple Myeloma	Sponsor: Celgene Corporation **Local PI: Henrik Gregersen**, Consultant, MD, PhD, Department of Haematology, Aalborg UH	EudraCT No.: 2020-000431-49
GC-MDS-AML - Gastrointestinal complication in Patients with Myelodysplastic Syndrome or Acute Myeloid Leukemia undergoing Treatment with 5-Azacitidin - A clinical follow-up study of patients with haematological malignancies treated with 5-Azacitidin.	Sponsor: Christina Brock, Professor, DVM, PhD, Mech-Sense, Aalborg UH **PI: Marianne Tang Severinsen**, Professor, MD, PhD, Department of Haematology, Aalborg UH	N-20210017
GCT3013-03 - Phase 1b/2, Open-Label, Safety and Efficacy Study of Epcoritamab (GEN3013; DuoBody®-CD3xCD20) in Relapsed/Refractory Chronic Lymphocytic Leukemia and Richter's Syndrome	Sponsor: Genmab A/S **Local PI: Thor Høyer**, Senior Registrar, MD, Department of Haematology, Aalborg UH	EudraCT No.: 2020-000848-57
GCT3013-05 - A Randomized, Open-Label, Phase 3 Trial of Epcoritamab vs Investigator's Choice Chemotherapy in Relapsed/Refractory Diffuse Large B-cell Lym-phoma	Sponsor: Genmab A/S **Local PI**: **Paw Jensen**, Consultant, MD, Department of Haematology, Aalborg UH	EudraCT No.: 2020-003016-27
GCT3014-01 - An Open-Label, Multicenter, Phase 1/2 Trial of GEN3014 (HexaBody®-CD38) in Relapsed or Refractory Multiple Myeloma and Other Hematologic Malignancies	Sponsor: Genmab A/S **Local PI: Henrik Gregersen**, Consultant, MD, PhD, Department of Haematology, Aalborg UH	EudraCT No.: 2020-003781-40
GenKabCell - Genetic characterisation of B-cell neoplasia	Charlotte G. Nyvold, Professor, MSc, PhD, Department of Haematology, Odense University Hospital **Local PIs: Karen Dybkær**, professor, MSc, PhD, and **Marianne Tang Severinsen**, Professor, MD, PhD, Department of Haematology, Aalborg UH	S-20160069
Golden Gate - Phase 3 Randomized, Controlled Study of Blinatumomab Alternating with Low-intensity Chemotherapy Versus Standard of Care for Older Adults with Newly Diagnosed Philadelphia-negative B-cell Precursor Acute Lymphoblastic Leukemia with Safety Run-in	Sponsor: Amgen **Local PI: Marianne Tang Severinsen**, Professor, MD, PhD, Department of Haematology, Aalborg UH	EudraCT No.: 2020-004498-29

Study Title	Principal Investigator (PI)	Approval ID
hMN - *Identifikation og funktionel betydning af medfødte genetiske varianter der prædisponerer til myeloid neoplasi hos voksne i Danmark*	Kirsten Grønbæk, Professor, MD, DMSc, Department of Haematology, Rigshospitalet, Copenhagen. **Local PI: Marianne Tang Severinsen**, Professor, MD, PhD, Department of Haematology, Aalborg UH	2104062 (NVK[1])
InMind - A Phase 3, Randomized, Double-Blind, Placebo-Controlled, Multicenter Study to Evaluate the Efficacy and Safety of Tafasitamab Plus Lenalidomide in Addition to Rituximab Versus Lenalidomide in Addition to Rituximab in Patients with Relapsed/Refractory (R/R) Follicular Lymphoma Grade 1 to 3a or R/R Marginal Zone Lymphoma	Sponsor: Incyte Corporation **Local PI**: **Paw Jensen**, Consultant, MD, Department of Haematology, Aalborg UH	EudraCT No.: 2020-004407-13
Limber 313 - A Phase 3, Randomized, Double-Blind, Placebo-Controlled Study of the Combination of PI3Kδ Inhibitor Parsaclisib and Ruxolitinib in Participants with Myelofibrosis	Sponsor: Incyte Corporation **Local PI: Gitte Thomsen**, Consultant, MD, Department of Haematology, Aalborg UH	EudraCT No.: 2020-003130-21
LD-VenEx - Phase II Study of Azacitidine in Combination with Low Dose Intensity Venetoclax in Patients with Acute Myeloid Leukemia With integration of Explorative Multi-Omics and ex vivo Drug Screening Data	Kim Theilgaard-Mönch, MD, DMSc, Department of Haematology, Rigshospitalet, University of Copenhagen **Local PI: Marianne Tang Severinsen**, Professor, MD, PhD, Department of Haematology, Aalborg UH	EudraCT No.: 2020-005461-14
MagnetisMM-32 – A phase III, open-label study of Elranatamab Mpnotherapy versus Elotuzumab, Pomalidomide, Dexamethasone (EPd) or Pomalidomide, Bortezomide, Dexamethasone (PVd) or Carfilzomib, Dexamethasone (Kd) in participants with relapsed/refractory multiple myeloma who received prior anti-CD38 directed therapy	Sponsor: Pfizer **Local PI: Henrik Gregersen**, Consultant, MD, PhD, Department of Haematology, Aalborg UH	EudraCT NUMBER: 2023-507871-23-00
MajesTEC-3 - A Phase 3 Randomized Study Comparing Teclistamab in Combination with Daratumumab SC (Tec-Dara) versus Daratumumab SC, Pomalidomide, and Dexamethasone (DPd) or Daratumumab SC, Bortezomib, and Dexamethasone (DVd) in	Sponsor: Janssen-Cilag A/S **Local PI: Henrik Gregersen**, Consultant, MD, PhD, Department of Haematology, Aalborg UH	EudraCT No.: 2020-004742-11

[1] The Danish National Committee on Health Research Ethics (National Videnskabsetisk Komite)

Study Title	Principal Investigator (PI)	Approval ID
Participants with Relapsed or Refractory Multiple Myeloma"		
MajesTEC-7 - A Phase 3 Randomized Study Comparing Teclistamab in Combination with Daratumumab SC and Lenalidomide (Tec-DR) and Talquetamab in Combination with Daratumumab SC and Lenalidomide (Tal-DR) versus Daratumumab SC, Lenalidomide, and Dexamethasone (DRd) in Participants with Newly Diagnosed Multiple Myeloma Who are Either Ineligible or not Intended for Autologous Stem Cell Transplant as Initial Therapy	Sponsor: Janssen-Cilag A/S **Local PI: Henrik Gregersen**, Consultant, MD, PhD, Department of Haematology, Aalborg UH	EudraCT Number: 2022-000909-28
MajesTEC-9 - A Phase 3 Randomized Study Comparing Teclistamab Monotherapy versus Pomalidomide, Bortezomib, Dexamethasone (PVd) or Carfilzomib, Dexame-thasone (Kd) in Participants with Relapsed or Refractory Multiple Myeloma who have Received 1 to 3 Prior Lines of Therapy, Including an Anti-CD38 Monoclonal Antibody and Lenalidomide	Sponsor: Janssen-Cilag A/S **Local PI: Henrik Gregersen**, Consultant, MD, PhD, Department of Haematology, Aalborg UH	EudraCT No. 2022-000928-37
MICRO - MethylphenIdat, doubleblind, placebo-controlled CROss-over trial	Henrik Frederiksen, Consultant, MD, PhD, Odense University Hospital **Local PI: Henrik Gregersen**, Consultant, MD, PhD, Department of Haematology, Aalborg UH	S-20170101
MK1026-003 - A Phase 2 Study to Evaluate the Efficacy and Safety of MK-1026 in Participants with Hematologic Malignancies	Sponsor: MSD Danmark Aps **Local PI**: **Thor Høyer**, Senior Registrar, MD, Department of Haematology, Aalborg UH	EudraCT No: 2020-002324-36
MK1026-008 - A Phase 2 Study to Evaluate the Efficacy and Safety of MK-1026 in Participants with Hematologic Malignancies	Sponsor: MSD Danmark Aps **Local PI**: **Thor Høyer**, Senior Registrar, MD, Department of Haematology, Aalborg UH	EudraCT No: 2022-500164-35-00
MK1026-011 - A Phase 3, Randomized Study to Compare Nemtabrutinib Versus Comparator (Investigator's Choice of Ibrutinib or Acalabrutinib) in Participants With Untreated Chronic Lymphocytic Leukemia/Small Lymphocytic Lymphoma (BELLWAVE-011)	Sponsor: MSD Danmark Aps **Local PI**: **Thor Høyer**, Senior Registrar, MD, Department of Haematology, Aalborg UH	EudraCT No: 2022-501697-19-01

Study Title	Principal Investigator (PI)	Approval ID
NIPA - Non-invasive Diagnosis of Invasive Pulmonary Aspergillosis by use of Biomarkers in Exhaled Breath Condensate	**Inger Lise Gade**, MD, PhD, Senior Registrar, Department of Haematology, Aalborg University Hospital, Department of Haematology, Aarhus University Hospital	N-20190070
NGAM12 - Double-blind, Randomized, Placebo-controlled, Prospective Phase III Study Evaluating Efficacy and Safety of Panzyga in Primary Infection Prophylaxis in Patients with Chronic Lymphocytic Leukemia ("PRO-SID" study)	Sponsor: Octapharma Pharmazeutika **Local PI: Thor Høyer,** Senior Registrar, MD, Department of Haematology, Aalborg UH	EudraCT No. 2019-004375-40
NILEX - Non-invasive Diagnosis of Pulmonary Embolism by use of Biomarkers in Exhaled Breath Condensate	**Inger Lise Gade**, MD, PhD, Senior Registrar, Department of Haematology, Aalborg University Hospital, Department of Haematology, Aarhus University Hospital	N-20180086
NOVIT-1 - Early detection and prevention of Neuropathy and Cognitive Impairment following treatment for Haematological Malignancies	**Marianne Tang Severinsen**, Professor, MD, PhD, Department of Haematology, Aalborg UH	N-20190068
POLAR BEAR - R-MINI-CHOP versus R-MINI-CHP in combination with polatuzumab-vedotin, as primary treatment for patients with diffuse large B-cell lymphoma, ≥80 years, or frail ≥75 years – an open label randomized Nordic Lymphoma Group phase III trial - NLG-LBC7	Sponsor: Nordic Lymphoma Group. Coordinating PI: Mats Jerkeman, Lund University Hospital, Lund, Sweden. **Local PI: Jakob Madsen**, Department Medical Director, Department of Haematology, Aalborg University Hospital.	H-20028621
PRO-B-HMA - Quality-of-life and treatment effect associated with the use of DNA hypomethylating drugs in the treatment of myelodysplastic syndrome, chronic myelomonocytic leukaemia and acute myeloid leukaemia – a Danish nationwide study	Christen Lykkegaard Andersen and Professor, DMSc, Chief Consultant, Haematologist Kirsten Grønbæk **Local PI: Marianne Tang Severinsen**, Professor, MD, PhD, Department of Haematology, Aalborg UH	H-20032246
ProSeq Cancer (Haematology) *En prospektiv undersøgelse af omfattende genomiske analyser hos patienter med uhelbredelig kræft, med henblik på målrettet behandling*	Morten Ladekarl, Professor, MD, PhD, Department of Oncology, Aalborg UH **Local PI: Marianne Tang Severinsen**, Professor, MD, PhD, Department of Haematology, Aalborg UH	N-20200018
PTH - Targeted treatment of patients with haematological diseases	Kirsten Grønbæk, Professor, MD, DMSc, Department of Haematology, Rigshospitalet, Copenhagen. **Local PIs: Marianne Tang Severinsen**, Professor, MD, PhD, Department of Haematology, Aalborg UH, **Anne Roug**, Clinical Associate Professor, MD, PhD, Department of Clinical Medicine, Aalborg University; **Karen Dybkær**, Professor, MSc, PhD, Department of Haematology, Aalborg UH; **Martin Bøgsted**, Professor, MSc, PhD, Department of Haematology, Aalborg UH	1705391 (NVK)

Study Title	Principal Investigator (PI)	Approval ID
RetroGen - *Retrospektiv analyse af kemoterapi-specifik molekylær resistens ved hæmatologiske kræftsygdomme - multiparametriske undersøgelser af arkiveret væv og blod registreret i klinisk biobankdatabase 1990-2022*	**Karen Dybkær**, Professor, MSc, PhD, Department of Haematology, Aalborg UH	N-20140099
RetroSeq - *Retrospektiv gensekventering og personlig medicin - Afprøvning af ny in vitro gendiagnostik omfattende gensekventering af humant væv med henblik på klinisk validering af personlig medicin-konceptet.*	**Karen Dybkær**, Professor, MSc, PhD, Department of Haematology, Aalborg UH	1706295 (NVK)
SABLe - Selinexor with alternating bortezomib or lenalidomide plus dexamethasone in transplant ineligible newly diagnosed multiple myeloma patients	Ida Bruun Kristensen, MD, Odense University Hospital, Department of Haematology on behalf of Nordic Myeloma Study Group **Local PI: Henrik Gregersen,** Consultant, MD, PhD, Department of Haematology, Aalborg UH	EudraCT No.: 2020-006060-89
Sentry (XPORT-MF-034) - A phase 1/3 study to evaluate the efficiacy and safety of SELINEXOR, a selective inhibitor of nuclear export, in combination with RUXOLITINIB in treatment-naïve patients with myelofibrosis	Sponsor: Karyopharm Therapeutics Inc. **Local PI: Marianne Tang Severinsen**, Professor, MD, PhD, Department of Haematology, Aalborg	EudraCT No.: 2023-506139-13-00
SGN35-031 - A Randomized, Double-blind, Placebo-Controlled, Active-Comparator, Multi-center, Phase 3 Study of Brentuximab Vedotin or Placebo in Combination with Lenalidomide and Rituximab in Subjects with Relapsed or Refractory Diffuse Large B-cell Lymphoma	Sponsor: Seagen Inc. **Local PI: Jakob Madsen**, Department Medical Director, Department of Haematology, Aalborg University Hospital.	EudraCT No.: 2020-002686-33
Skyglo - A phase III, multicenter, randomized, openlabel study comparing the efficiacy and safety of Glofitamab (RO7082859) in combinaton with polatuzumab vedotin plus rituximab, cyclophosphamide, doxorubicin, and predisone (pola-r-chp) versus polarchp in patients with large b-cell lymphoma.	Sponsor: Roche Pharmaceuticals a/s **Local PI**: **Paw Jensen**, Consultant, MD, Department of Haematology, Aalborg UH	EudraCT No.: 2023-504028-24-00
Transform2 - A Randomized, Open-Label, Phase 3 Study Evaluating Efficacy and Safety of Navitoclax in Combination with Ruxolitinib Versus Best Available Therapy in Subjects with Relapsed/Refractory Myelofibrosis	Sponsor: ABBVIE A/S **Local PIs: Marianne Tang Severinsen**, Professor, MD, PhD, Department of Haematology, Aalborg	EudraCT No. 2020-000557-27

Study Title	Principal Investigator (PI)	Approval ID
Vertebroplasty - Palliative treatment of multiple myeloma patients with painful vertebral lesions. A multicenter randomized controlled trial of vertebroplasty in addition to usual treatment	Professor Niels Abildgaard, Head of Research, Haematology Pathology Research Laboratory, Department of Haematology, Odense University Hospital. **Local PI: Henrik Gregersen**, Consultant, MD, PhD, Department of Haematology, Aalborg UH	S-20200075

Supervision and Students' Projects

PhD Defences in 2024

Eva Futtrup Maksten, MD, Department of Haematology
Title: *Survivorship among patients with haematological cancer: work disability, dementia, and neuropathy.* PhD defence: 15 March 2024

Joachim Bæch, MD, Department of Haematology
Title: *Late toxicities in lymphoma: real-world data on cardiotoxicity, diabetes mellitus, and second malignancies.* PhD defence: 2 February 2024

Issa Ismail Issa, MSc in Biomedicine, Department of Clinical Medicine, Aalborg University
Title: *Genetic determinants of drug response in diffuse large B-cell lymphoma.* PhD defence: 17 May 2024

Lars Hernández Nielsen, MSc in Economics, Department of Haematology
Title: *Individual-based registrations of systemic anti-cancer therapy for monitoring expenditures and access to treatment.* PhD defence: 1 November 2024

Ongoing PhD projects

Ahmed Ludvigsen Al-Mashhadi, MD, Department of Haematology
Title: *Outcomes of rare lymphomas.* Enrolment: 1 September 2021. Supervisors: Tarec Christoffer El-Galaly (main), Lasse Hjort Jakobsen, Thomas Stauffer Larsen (Syddansk Universitet)

Daniel Kristensen, MD, Department of Haematology
Title: *REFORM-AML: A nationwide retrospective study of population-based acute myeloid leukemia tumor genetic data.* Enrolment: 1 October 2021. Supervisors: Anne Stidsholt Roug (main), Martin Bøgsted, Marianne Tang Severinsen, Rasmus Froberg Brøndum

Rasmus Rask Kragh Jørgensen, MSc in Operations Research, Department of Haematology
Title: *Advanced statistical methods for studies of lymphoma prognosis and treatment outcomes in a real-world setting.* Enrolment: 15 November 2021. Supervisors: Lasse Hjort Jakobsen

(main), Tarec Christoffer El-Galaly, Andreas Kiesbye Øvlisen, Marianne Tang Severinsen, Sandra Eloranta (Karolinska Institutet)

Maja Zimmer Jakobsen, MSc in Health Science and Technology, BSc in nursing, Department of Haematology
Title: *Multidisciplinary investigation of proteasome inhibitor response in multiple myeloma.* Enrolment: 1 November 2022. Supervisors: Karen Dybkær (main), Henrik Gregersen, Hanne Due, Rasmus Froberg Brøndum

Maren Poulsgaard Jørgensen, MD, Department of Haematology
Title: *Socioeconomic impact, comorbidities and long-term outcomes related to mastocytosis and the treatment hereof.* Enrolment: 1 January 2023. Supervisors: Marianne Tang Severinsen (main), Tarec C. El-Galaly, Andreas Kiesbye Øvlisen

Hulda Haraldsdóttir, MSc in Health Science and Technology, Department of Haematology
Title: *The role of DNA Damage Repair in selected cancers.* Enrolment: 1 January 2023. Supervisors: Karen Dybkær (main), Hanne Due, Inge Søkilde Pedersen, Rasmus Froberg Brøndum

Lisa-Maj Christensen, MD, Department of Haematology
Title: *Characteristics, treatment and survival in patients with mixed phenotype acute leukemia.* Enrolment: 1 January 2023. Supervisors: Marianne Tang Severinsen (main), Karen Dybkær, Tarec C. El-Galaly, Kirsten Grønbæk.

Mette Hyllegaard Madsen, MD, Department of Occupational and Environmental Medicine and Department of Haematology
Title: *Environmental exposures and risk of hematologic cancers.* Enrolment: 1 August 2023. Supervisors: Jakob Hjort Bønløkke (main), Marianne Tang Severinsen, Else Toft Würtz, Jörg Schullehner

Mikkel Runason Simonsen, statistician, Department of Mathematical Sciences, AAU, and Department of Haematology
Title: *Improving the clinical utility of prognostic tools through calibration*
Enrolment: 1 November 2023. Supervisors: Rasmus Waagepetersen (main), Lasse Hjort Jakobsen, Tarec C. El-Galaly

Lise Dueholm Bertelsen, MD, Department of Haematology
Title: *Environmental and Occupational Exposures and Risk of Acute Myeloid Leukemia and Multiple Myeloma.* Enrolment: 1 August 2024. Supervisors: Marianne Tang Severinsen (main), Martin Bøgsted, Jakob Hjort Bønløkke.

Vidthdyan Veeravakaran, MSc in medical biotechnology, Department of Haematology
Title: *Genome editing and functional tests of B-cells with somatic genetic variants in DNA damage repair genes made using CRISPR methods.* Enrolment: 1 August 2024. Supervisors: Karen Dybkær (main), Hanne Due, Rasmus Froberg Brøndum.

Master's Degrees Obtained

Christian Teglgaard, MD, received his master's degree in medicine on 24 January 2024 for the project: *Cardiovascular diseases after high dose chemotherapy and allogenetic stem cell transplant for acute leukemia: A Danish population-based study.* Supervisor: Marianne Tang Severinsen

Nanna Nørtoft Nielsen, Medical Student, received her master's degree in medicine on 24 January 2024 for the project *Second primary malignancies following intensive treatment for adult acute leukemia: A Danish population-based cohort study.* Supervisors: Marianne Tang Severinsen, Daniel Tuyet Kristensen

Rathiba Sivarooban, MD, received her master's degree in medicine on 16 January 2024 for the project *Infection Risk Before and After Diagnosis of Angioimmunoblastic T-Cell Lymphoma.* Supervisor: Tarec Christoffer El-Galaly

Simone Juliane Brommann and Linea Pilgaard, MSc, received their master's degrees in translational medicine on 18 June 2024 for the project *Real world data on use of azacitadine in the treatment of patients with high-risk myelodysplastic syndromes in the period 2010-2022*. Supervisors: Anne Estrup Olesen, Marianne Tang Severinsen

Vidthdyan Veeravakaran, MSc, received his master's degree in medical biotechnology on 13 June 2024 for the project *Investigating Autophagy and Cisplatin Response Genes Connected to DLBCL in C. elegans models.* Supervisors: Karen Dybkær, Anders Olsen

Ongoing Master's Projects

Medical students Mikkel Kristian Kanstrup, Simon Magersholt Lausten and Sebastian Lawrence
Project title: *Epidemiology of Chronic Myeloproliferative Neoplasia in Denmark: A Danish populationbased cohort study.* Start: 1 September 2024. Supervisor: Marianne Tang Severinsen

Medical students Sofie Amalie Sørensen and Sofie Solhøj Jønsson
Project title: *Temporal changes in survival among adult patients with chronic myeloid leukaemia in the period 1995-2023 – a Danish nationwide population-based study.* Start: 1 September 2024. Supervisor: Marianne Tang Severinsen

Master student in biotechnology Fardowsa Osman
Project title: *Bioinformatic analysis of CRISPR-generated data.* Start: 1 September 2024. Supervisors: Anne Krogh Nøhr, Hanne Due

Research Year Students

Nanna Nørtoft Nielsen, Medical Student, 1 January – 31 December 2024
Project title: *Reproductive patterns and childbirth rates in adult acute leukemia survivors: A*

Danish population-based study. Supervisors: Marianne Tang Severinsen, Daniel Tuyet Kristensen

Bachelor Students

Emilie Jensen, Julie Houlind Wittrup, Victoria Dagmar Frank Stentoft, and Jonas Johnsen Abou-Harb received their bachelor's degrees in medicine on 26 June 2024 for the project *Is it possible to distinguish Pneumocystis jiroveci colonization from infection by analysis of the exhaled breath condensate?* Supervisors: Inger Lise Gade, Marianne Tang Severinsen.

Research Assistant Projects

Rasmus Mejlby Virenfeldt, BSc
Project title: *Development of device to collect exhaled breath proteins and metabolites*. Supervisor: Inger Lise Gade

Simone Juliane Brommann and Linea Pilgaard, MSc
Project title: *Healthcare utilization in high-risk MDS on azacitidine.* Supervisor: Marianne Tang Severinsen

Asta Brogaard Christensen, **MSc**
Project title: *Ketone and genetic impact on chemotherapy response in hematologic cancer.* Supervisors: Karen Dybkær, Hanne Due, Issa Ismail Issa, Inger Lise Gade

Jonas Larsen Pedersen, MD
Project title: *Review of current proteomic discoveries in exhaled breath*. Supervisor: Inger Lise Gade

Suzanna Stachowiak, MSc
Project title: *Genetic analysis of candidate genes controlling treatment response in hematologic cancer.* Supervisor: Hanne Due

5 Research Grants and Awards

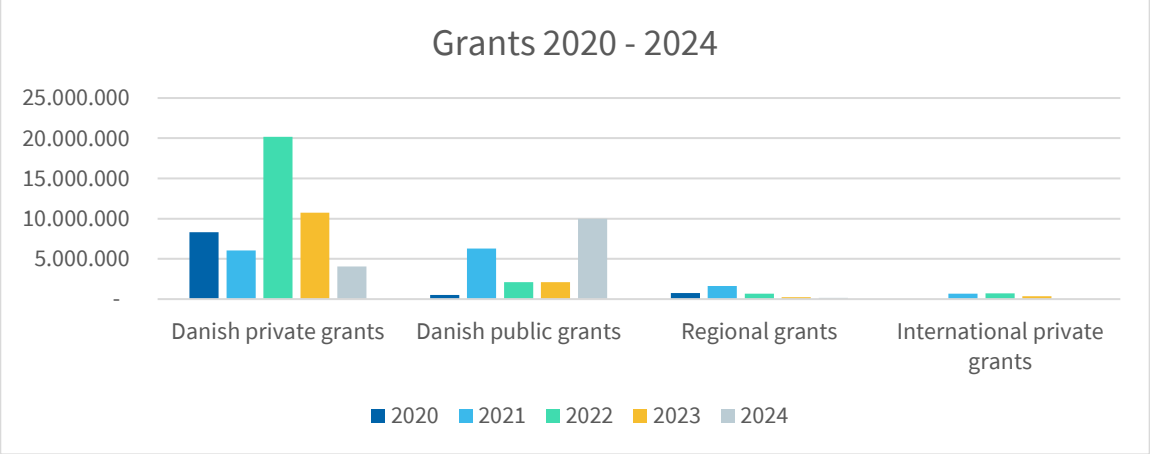
External Funding

In 2024 the Research Section of Department of Haematology at Aalborg University Hospital sent 30 applications for funding resulting in 11 grants amounting to 14.2 million DKK from Danish and international private and public foundations. In 2023, we achieved funding amounting to 13.5 million DKK. Below is an overview of funders and the projects receiving grants in 2024.

Table 2 | Funding secured in 2024

Funder	Project	Recipient	Type	Duration
A.P. Møller Fonden til Lægevidenskabens Fremme	DLBCL	Hanne Due	Danish private grant	2024-2026
A.P. Møller Fonden til Lægevidenskabens Fremme	PhD	Vidthdyan Veeravakaran	Danish private grant	2025-2026
Danish Cancer Society, Knæk Cancer	tDCS	Marianne T. Severinsen	Danish private grant	2025-2028
Danish Regions' Medicine Pool	Vidaza	Marianne T. Severinsen	Danish public grant	2025-2026
Harboe Foundation, Nursing PhD Start-up	Pre PhD	Mette L. Roed	Danish private grant	2024-2025
Health Hub - Founded by Spar Nord Fonden	Device development	Inger Lise Gade	Regional grant	2025
North Denmark Region (Sundhedsvidenskabelige Forskningsfond)	Pre PhD	Mette L. Roed	Regional grant	2025-2026
Novo Nordisk Foundation, Clinical Emerging Investigator	ExBreDiMo group	Inger Lise Gade	Danish private grant	2025-2030
Reservelægefonden	Travel grant (EHA)	Eva F. Maksten	Regional grant	2024
Aase & Einar Danielsen's Foundation	PhD	Maren P. Jørgensen	Danish private grant	2024-2025
Aase & Einar Danielsen's Foundation	VUS-DLBCL	Hanne Due	Danish private grant	2024-2026

Figure 2 | Breakdown of types of research grants awarded in 2020 – 2024



Major Research Project Grants Awarded in 2024

New and simplified home treatment of chemotherapy-induced nerve injuries may be eased by means of neuromodulation

Consultant, Professor in clinical haematology, Marianne Tang Severinsen and Professor Jens Brøndum Frøkjær, Department of Radiology, received DKK 2.9 million from the '*Knæk Cancer*' funds for a joint research project in neuropathy. The project title is "New home-based neuromodulation approach for treatment of sensory complications in chemotherapy-induced peripheral neuropathy".

Exploring exhaled breath biomarkers for non-invasive diagnostics showcased by stroke and pulmonary embolism

Inger Lise Gade, senior registrar, PhD, Department of Haematology and associate professor, Department of Clinical Medicine, AAU, received the prestigious 'Clinical Emerging Investigator' grant of 9.9 million DKK from the Novo Nordisk Foundation for a research project concerning early diagnostics of stroke and pulmonary embolism by means of exhaled breath.

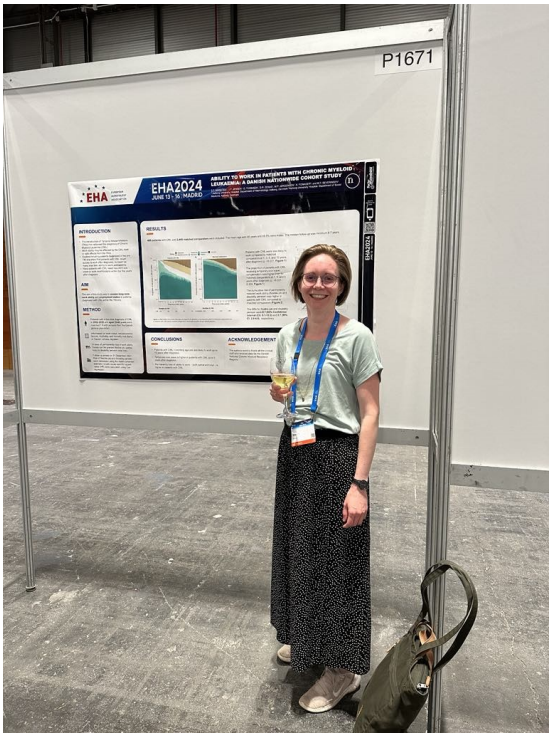
The photo shows Inger Lise presenting the ideas of her research project at a meeting at Aalborg UH.

6 Dissemination of Scientific Output

Conference contributions

European Hematology Association (EHA) Annual Meeting

In June, Eva Futtrup Maksten, MD, PhD, participated with a poster at EHA 2024 presenting her PhD project ”Ability to Work in patients with Chronic Myeloid Leukaemia: a Danish Nationwide Cohort Study”, and Rasmus Rask Kragh Jørgensen, MSc, PhD, also presented his work ”Data requirements for development of prediction models for survival among Hodgkin lymphoma patients: How many patients are needed” at the poster session.



International Association of Breath Research Summit, Indianapolis

In June 2024 Inger Lise Gade, MD, PhD, senior registrar participated with two abstracts at the IABR Summit: “Protein composition of the exhaled breath from hospitalized COVID-19 patients” and “Comparison of protein composition of exhaled breath collected by two different methods”.

CRISPR MEDiCiNE Conference 2024

On 23 – 25 April in Copenhagen two posters were presented at the first CRISPR Medicine Conference. The first, “Genome-wide CRISPR-Cas9 knockout screen identifies DNA damage response pathways and BTK as essential for cisplatin response in diffuse large B-cell lymphoma” by Issa Ismail Issa et al. won best poster award (mentioned elsewhere). The other poster was “CRIPSR screen identifies UBE2A loss-of-function to confer bortezomib sensitivity in diffuse large B-cell lymphoma” by Hanne Due et al.

EHA-SfPM Precision Medicine Meeting

On 25 – 27 September two posters from Department of Haematology were presented at “EHA-SfPM Precision Medicine Meeting in Copenhagen: Bridging between functional and genomic precision medicine”, . Issa Ismail Issa, MSc, PhD, presented the project “CRISPR-Cas9 knockout screens identify DNA damage response pathways and BTK as essential for cisplatin response in diffuse large B-cell lymphoma” and Hanne Due, postdoc, MSc, PhD, presented her poster “A case of myeloid neoplasm with eosinophilia and rearrangement of PDGFRB: the importance of RNA-sequencing analysis in the absence of cytogenetic changes”.

Research Stay Abroad

Hulda Haraldsdóttir, PhD student at Aalborg University Hospital, had a research stay at deCODE Genetics in Reykjavik, Iceland in December 2024. During her stay, she observed and participated in the high-throughput laboratory handling of samples as well as analysing genome data.

Media Publicity

Common Diabetes Drug May Lower Risk of Rare Blood Cancers

A Danish study, led by Daniel Tuyet Kristensen, Department of Haematology, Aalborg University Hospital, suggests that metformin, a widely used diabetes medication, may reduce the risk of developing myeloproliferative neoplasms (MPNs)—a group of rare blood cancers. Researchers analysed data from 2010 to 2018 and found that long-term metformin users had a significantly lower incidence of MPNs compared to non-users.

The protective effect was observed across all MPN subtypes and was strongest among individuals who had taken metformin for more than five years. The study highlights metformin’s anti-inflammatory properties as a possible explanation, given the inflammatory nature of MPNs. While promising, the findings are based on registry data and do not account for lifestyle factors such as smoking or diet. Further research is planned to explore similar effects in other cancer types.

The findings were published in *Blood Advances*. Read the article here: The use of metformin and risk of myeloproliferative neoplasms among patients with no registered markers of diabetes | Blood Advances | American Society of Hematology.

The results were also noticed and referenced by the media "The Sun". Read their news article here: Old drugs, new tricks? Could a common diabetes drug taken by millions prevent cancer? Scientists raise hope of breakthrough | The Sun) and here: Metformin medfører tilsyneladende nedsat risiko for at udvikle MPN in "*Hæmatologisk Tidsskrift*" (Danish)

Immigrants Survive Blood Cancer as Well as Native Danes

A study from Aalborg University Hospital shows that immigrants in Denmark have the same chances of surviving blood cancer as native-born Danes. Analysing data from over 43,000 patients diagnosed between 2000 and 2020, researchers found five-year survival rates to be nearly identical across groups: 58% for native Danes, 57% for immigrants from Western countries, and 56% for those from non-Western backgrounds.

The study, led by Dr Joachim Bæch and Professor Tarec Christoffer El-Galaly from Department of Haematology, highlights that equitable treatment outcomes are achieved regardless of patients' cultural or linguistic backgrounds. Although non-Western immigrants had slightly more hospitalisation days before and after diagnosis, this did not affect survival rates.

The findings are published in the *European Journal of Epidemiology* and supported by the Danish Cancer Society's "*Knæk Cancer*" initiative. Find the article here: Survival outcomes and healthcare utilization between immigrant patients and Danish-born patients with hematological cancers: a Danish population-based study | European Journal of Epidemiology and read about the results (in Danish) at the Danish Cancer Society's homepage: *Ny forskning: Indvandrere overlever blodkræft lige så godt som danskfødte patienter*

Adult Leukaemia Patients Now Living Longer

A study, led by Professor Marianne Tang Severinsen and Daniel Tuyet Kristensen from Department of Haematology, Aalborg University Hospital, shows that adults diagnosed with acute lymphoblastic leukaemia (ALL) in Denmark have experienced a significant improvement in survival rates over the past two decades. While ALL is commonly known as childhood leukaemia, one-third of cases occur in adults. The study reveals that 2-year survival among adults has increased from 30% to 70%, thanks to better diagnostics, improved management of treatment complications, and the adoption of intensive therapies previously reserved for children.

Additionally, the introduction of targeted medication for patients with the Philadelphia chromosome has dramatically improved outcomes for this subgroup.

The findings were published in the European Journal of Cancer. Find the article her: Temporal changes in survival among adult patients with acute lymphoblastic leukaemia diagnosed in the period 1998-2020 – A Danish nationwide population-based cohort study - European Journal of Cancer.

Find news articles in Danish here; *Voksne leukæmipatienter lever længere | TV2 Nord*, *MinByVestbyen - Nye behandlinger for leukæmi øger overlevelse*

Collaborations

- Clinical Cancer Research Center (CCRC) Aalborg UH
- Aalborg University, Denmark
- Aarhus University, Denmark
- Odense University, Denmark
- University of Copenhagen, Denmark
- Mayo Clinic, Rochester, Minnesota, USA
- Stanford University, California, USA
- Karolinska Universitetet, Stockholm, Sweden
- Oslo University, Oslo, Norway
- The University of Western Australia, Perth, Western Australia, Australia
- The University of British Columbia, Vancouver, British Columbia, Canada
- Duke University, Durham, North Carolina, USA
- Universitetet i Tromsø, Norges Arktiske Universitet, Tromsø, Norway
- NTNU – Norwegian University of Science and Technology, Trondheim, Norway
- University of Nebraska Medical Center, Omaha, Nebraska, USA
- Mechanical and Aerospace Engineering, University of California, Davis, USA
- Milipore Sigma, Bellafonte, USA

National and International Society Memberships and Chairs

- Acute Leukemia Group (ALG)
- Danish Lymphoma Group (DLG)
- Danish Myeloma Study Group (DMSG)
- Danish National Genome Center (NGC) Research and Infrastructure Committee
- Danish Study Group for Chronic Myeloid Diseases (DSKMS)
- Dansk Hæmatologisk Selskab (DHS)
- Nordic AML Group (NAML)
- European Haematology Association (EHA)
- International Association for Breath Research (IABR)
- Nordic Lymphoma Group (NLG)
- Nordic MDS Group (NMDSG)
- Nordic Myeloma Study Group (NMSG)
- Medical Research Council UK (MRC)
- Scandinavian Thrombosis and Cancer group (STAC)

7 Scientific Output

Bibliometrics

Table 3 | h-index of research leaders. Indexed publications, citations, and H-index

Title	Name	Publications		Citations		H-index	
		Scopus	WoS	Scopus	WoS	Scopus	WoS
Professor	Marianne Tang Severinsen	109	185	2911	2785	27	27
Professor	Karen Dybkær	134	218	5565	5528	39	39
Professor	Tarec Christoffer El-Galaly*	143	288	3250	3256	31	32
Assoc. Prof.	Inger Lise Gade	20	29	350	351	10	10

Data optained by the Medial Library, May 2025. and derive from Scopus and Web of Science (WoS).

Not all publications are indexed in Scopus or Web of Science

*) Tarec Christoffer El-Galaly was a clinical professor at Department of Haematology until August 2024.

Figure 3 | Number of publications in subcategories in the past 10 years (2015-2024)

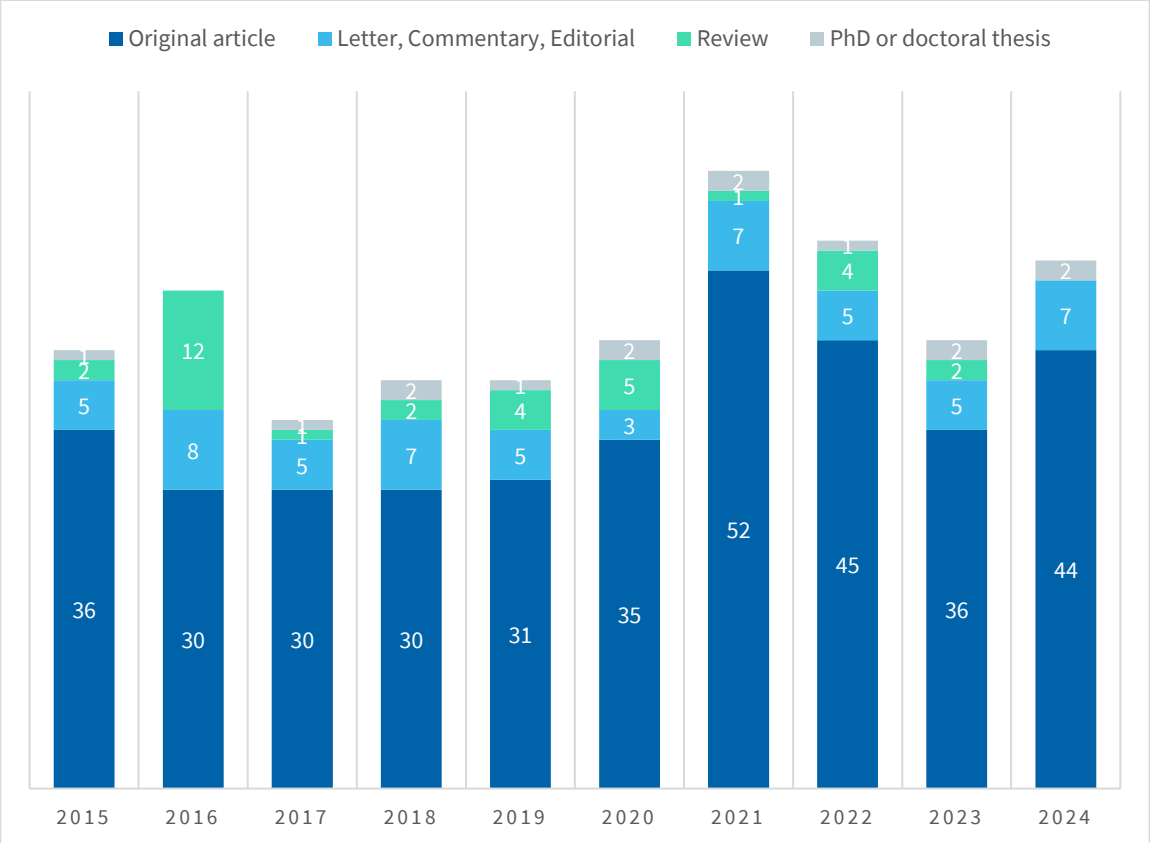
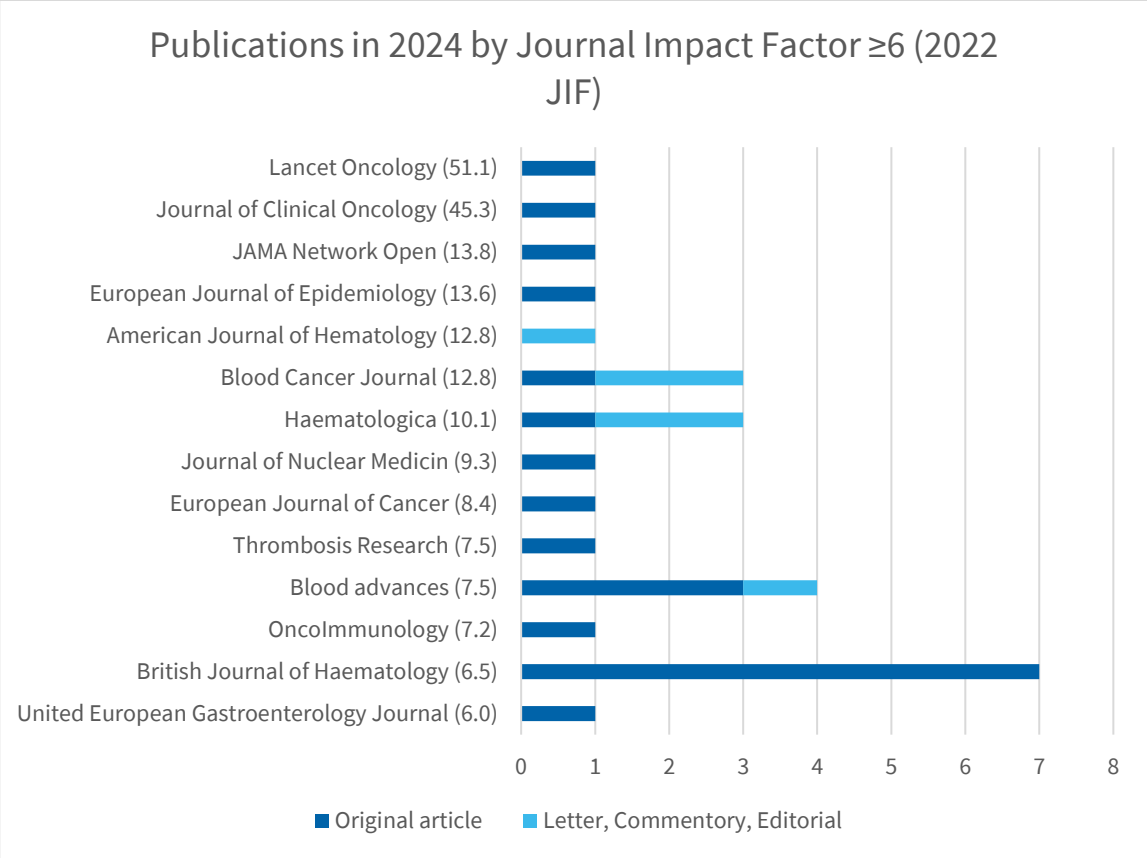


Figure 4 | Papers published in journals with impact factor (IF) ≥6 (IF given in brackets)
In 2024, 27 papers were published in journals with impact factor 6 or above.



8 Publications

Impact Factor >10

Original articles

1. Fürstenau, M, Kater, AP, Robrecht, S, von Tresckow, J, Zhang, C, Gregor, M, Thornton, P, Staber, PB, Tadmor, T, Lindström, V, Juliusson, G, Janssens, A, Levin, M-D, da Cunha-Bang, C, Schneider, C, Goldschmidt, N, Vandenberghe, E, Rossi, D, Benz, R, Nösslinger, T, Heintel, D, Poulsen, CB, Christiansen, I, Frederiksen, H, Enggaard, L, Posthuma, EFM, Issa, DE, Visser, HPJ, Bellido, M, Kutsch, N, Dürig, J, Stehle, A, Vöhringer, M, Böttcher, S, Schulte, C, Simon, F, Fink, A-M, Fischer, K, Holmes, EE, Kreuzer, K-A, Ritgen, M, Brüggemann, M, Tausch, E, Stilgenbauer, S, Hallek, M, Niemann, CU & Eichhorst, B 2024, 'First-line venetoclax combinations versus chemoimmunotherapy in fit patients with chronic lymphocytic leukaemia (GAIA/CLL13): 4-year follow-up from a multicentre, open-label, randomised, phase 3 trial', *The Lancet Oncology*, bind 25, nr. 6, s. 744-759. https://doi.org/10.1016/S1470-2045(24)00196-7 (IF 51.5)
2. Jemaa, S, Ounadjela, S, Wang, X, El-Galaly, TC, Kostakoglu, L, Knapp, A, Ku, G, Musick, L, Sahin, D, Wei, MC, Yin, S, Bengtsson, T, De Crespigny, A & Carano, RAD 2024, 'Automated Lugano Metabolic Response Assessment in 18F-Fluorodeoxyglucose-Avid Non-Hodgkin Lymphoma With Deep Learning on 18F-Fluorodeoxyglucose-Positron Emission Tomography', *Journal of Clinical Oncology*, bind 42, nr. 25, JCO2301978, s. 2966-2977. https://doi.org/10.1200/JCO.23.01978 (IF 45.3)
3. Nielsen, LH, Kristensen, DT, Jakobsen, LH, Bøgsted, M, Gregersen, H, Madsen, J, Severinsen, MT & Brøndum, RF 2024, 'Socioeconomic Status and Overall Survival Among Patients With Hematological Malignant Neoplasms', *JAMA Network Open*, bind 7, nr. 3, e241112. https://doi.org/10.1001/jamanetworkopen.2024.1112 (IF 13.8)
4. Baech, J, Jakobsen, LH, Simonsen, MR, Severinsen, MT, Frederiksen, H, Niemann, CU, Brown, P, Jørgensen, JM, Dann, EJ, Johnsen, SP & El-Galaly, TC 2024, 'Survival outcomes and healthcare utilization between immigrant patients and Danish-born patients with hematological cancers: a Danish population-based study', *European Journal of Epidemiology*, bind 39, nr. 8, s. 881–892. https://doi.org/10.1007/s10654-024-01139-z (IF 13.6)
5. Enemark, MH, Hemmingsen, JK, Andersen, MD, Hybel, TE, Bjørn, ME, Josefsson, PL, Pedersen, LM, Juul, MB, Pedersen, RS, Thorsgaard, M, Sillesen, IB, Plesner, TL, Hamilton-Dutoit, SJ, Jensen, P, Madsen, C & Ludvigsen, M 2024, 'Progression of disease within 24 months (POD24) in follicular lymphoma in the rituximab era: incidence, clinicopathological risk factors, and outcome in a population-based Danish cohort', *Blood Cancer Journal*, bind 14, 167. https://doi.org/10.1038/s41408-024-01150-3 (12.8)
6. Lia, K, Jørgensen, RRK, Wold, BL, Fluge, Ø, Fagerli, U-M, Bersvendsen, H, Bø, IB, Bhargava, S & Fosså, A 2024, 'Overall survival and causes of death in elderly patients with Hodgkin lymphoma: a Norwegian population-based case-control study', *Haematologica*, bind 109, nr. 5, s. 1403-1412. https://doi.org/10.3324/haematol.2023.283721 (IF 10.1)

Letters

7. Lund, T, Gundesen, MT, Juul Vangsted, A, Helleberg, C, Haukås, E, Silkjær, T, Asmussen, JT, Manuela Teodorescu, E, Amdi Jensen, B, Schmidt Slørdahl, T, Nahi, H, Waage, A, Abildgaard, N, Schjesvold, F & Nordic Myeloma Study Group 2024, 'In multiple myeloma, monthly treatment with zoledronic acid beyond two years offers sustained protection against progressive bone disease', *Blood Cancer Journal*, bind 14, nr. 1, 65. https://doi.org/10.1038/s41408-024-01046-2 (IF 12.8)

8. Verstovsek, S, Talpaz, M, Wadleigh, M, Isidori, A, te Boekhorst, P, Savona, MR, Bose, P, Pozdnyakova, O, Mesa, R, El-Galaly, TC, O'Sullivan, J, Gamel, K, Higgins, B, Katakam, S, Todorov, B, Trunzer, K & Harrison, CN 2024, 'A randomized, double-blind study of zinpentraxin alfa in patients with myelofibrosis who were previously treated with or ineligible for ruxolitinib: Stage 2 of a phase II trial', *Haematologica*, bind 109, nr. 6, s. 1977-1983. https://doi.org/10.3324/haematol.2023.284410 (IF 10.1)

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