

**Cancer research at
Haukeland University
Hospital
2024**

Strengthening Cancer Research through Insight, Integration and Collaboration

The year 2024 has been a pivotal phase in our pursuit of accreditation as Haukeland Comprehensive Cancer Centre (Haukeland CCC), in accordance with the standards set by the Organisation of European Cancer Institutes (OECI). This process has acted as a catalyst for strengthening the cancer research at Haukeland University Hospital by generating deeper insights into our institutional research performance, promoting further integration between clinical and academic environments, and strengthening the collaboration between our research groups.

The self-assessment process has been particularly valuable in generating detailed oncology-specific data across the hospital. This has provided critical insight into our strengths as well as areas in need of improvement. These findings are now informing targeted efforts to strengthen collaboration across research groups and to build a more robust and transparent research infrastructure in the hospital.

This scientific report presents selected highlights from our research groups in 2024, including the establishment of a hospital-wide Research Council for oncology and strategic initiatives aimed at meeting the standards for CCC accreditation. Together, these efforts reflect our ambition to deliver high-quality, evidence-based cancer care and to position Haukeland CCC as a leading centre for cancer research, innovation, and collaboration.

On behalf of the Cancer Board

Oddbjørn Straume

Director of the Cancer Clinic

Chair of the Cancer Board at Haukeland CCC



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Research Council at Haukeland CCC

The Research Council at Haukeland CCC was established as an advisory body to the Cancer Board, with responsibility for all aspects of cancer research. The Research Council is dedicated to strengthening and advancing cancer research across the entire spectrum; from fundamental discoveries to patient-centred innovation. Its overarching goal is to position Haukeland CCC as a national hub of excellence in highly specialised cancer care, as well as in basic, translational, and clinical cancer research. This integrated approach will foster the development of cutting-edge care, research, and education across all areas of the cancer field.

The main focus will be on clinical and translational cancer research. The Research council aim to achieve this through the following strategic priorities:

- Further develop research platforms within precision medicine and cell- and gene-based therapies.
- Biobanking: Further develop systems that ensure systematic sample collection throughout the patient care pathway and disease course, with active involvement from clinical departments
- Create interdisciplinary meeting arenas for patient-centred research
- Strengthen national and international networks
- Ensure that Haukeland University Hospital is a relevant and trusted partner in national and international research and development projects
- Systematically develop partnerships with patients and advocacy groups



Research Council from the left: Bjørn Tore Gjertsen, Kjersti Hestetun, Anne Mathilde Kvamme, Stian Knappskog, Line Bjørge, Cecilie Brekke Rygh, Jon-Helge Angelsen, Christian Moen, Elisabeth Wik and Liv Bolstad Hysing. Halfdan Sørbye, Marianne Aanerud and Kirsten Bøe not present when the photo was taken. Photo: Kirsten Bolstad

Working in close alignment with the Cancer Board at HUS, the Research Council provides strategic advice and supports the overall direction of cancer research at the hospital. It plays a key role in shaping research strategy, guiding complex grant applications, facilitating interdisciplinary collaboration, monitoring research activity, and strengthening networks between research groups. In addition to carrying out tasks assigned by the Cancer Board, the Research Council also initiates and drives forward new projects within defined strategic focus areas, fostering a dynamic and forward-looking research environment. Through these efforts, the Research Council helps shape a strong foundation for future-oriented cancer research and care—advancing scientific excellence while delivering value to patients and society.

The Research Council includes 13 members with broad expertise from clinical, diagnostic, and research units at the hospital. It also includes representatives from the University of Bergen and patient advocacy groups, ensuring diverse and inclusive input. Most members are senior professionals, while two represent early-career researchers to support continuity and mentorship. The Research Council meets monthly. To maintain momentum between meetings, a smaller working group of four members meets weekly to follow up on tasks and prepare items for discussion.

External Scientific Advisory Board (SAB)

An overarching external Scientific Advisory Board (SAB) will be established to advise the entire hospital on its cancer research strategy, organisation, infrastructure and overall performance. The Research Council has proposed candidates, ensuring broad expertise and international representation. An invitation to the members is underway. The SAB will meet at regular intervals and provide strategic input to support the hospital's development within cancer research.

Members of The Research Council

Head of Cancer Research **Line Bjørge**, Professor, MD, PhD, MBA, Cancer Clinic and Department of Obstetrics and Gynecology (Chair)

Senior Consultant **Marianne Aanerud**, Ass. Professor, MD, PhD, Department of Thoracic Medicine

Senior Consultant **Jon Helge Angelsen**, Ass. Professor, MD, PhD, Department of Gastrointestinal Surgery

Senior Consultant **Bjørn Tore Gjertsen**, Professor, MD, PhD, Department of Medicine, Section of Hematology

Consultant and molecular MDT advisor **Kjersti Hestetun** MD, PhD, Cancer Clinic

Research leader **Liv Bolstad Hysing**, Ass. Professor, MSc, PhD, Cancer Clinic, Section of Medical Physics

Professor and Senior Researcher **Stian Knappskog**, PhD, Cancer Clinic and Department of Clinical Science, UiB

Team leader Research Support **Anne Mathilde Kvamme**, MSc pharm, Research & Development

Dr. **Christian Arvei Moen**, MD, PhD, Department of Urology

Head **Cecilie Brekke Rygh**, PhD, Center for Nuclear Medicine and PET, Department of Radiology

Senior Consultant, **Halfdan Sørbye**, Professor, MD, PhD, Cancer Clinic

Head **Elisabeth Wik**, Professor, MD, PhD, Department of Pathology

Patient representative, **Kirsten G Bøe**

Overview of cancer research groups at Haukeland CCC

(alphabetical order)

Anaesthesia and Surgical Services <ul style="list-style-type: none">• Research Group for Palliative care	Department of Internal Medicine - Hematology <ul style="list-style-type: none">• PRECOS• The Signaling-Targeted Research Group
Cancer Clinic <ul style="list-style-type: none">• ART-FORSEE – Network in adaptive radiotherapy for novel treatment strategies• Brain Tumour Research group• Bergen radiotherapy research group• Cancer Caregiver Research Group• The Norwegian Cancer Origin Research Group (NorCORG)• Melanoma research group• Mohn Cancer Research Laboratory• Mohn Cancer Research Laboratory – Digestive High-Grade Neuroendocrine Neoplasms• Sarcoma group Haukeland University Hospital	Department of Radiology <ul style="list-style-type: none">• Bergen Cancer Imaging Research Group• Bergen Tracer Development Center, part of 180 °N• Neurostimulation and Brain Imaging Research Group (NBIG) and MMIV
	Department of Thoracic Medicine <ul style="list-style-type: none">• Bergen Respiratory Research Group
Children and Youth Clinic <ul style="list-style-type: none">• Oral Late Effects after Childhood Cancer Treatment Research Group• Pediatric Oncology Research Group at Haukeland University Hospital	Head and Neck Clinic <ul style="list-style-type: none">• Bergen Head and Neck Cancer Research Group

Laboratory Medicine and Pathology

- Brain Tumor & Microenvironment Research Group
- Breast Cancer of the Young – Bergen (BCY-B)
- Cancer cell plasticity and therapy resistance group
- Computational Pathology Bergen (COMPAT Bergen)
- Early Breast Cancer
- Experimental Pathology Research Group
- Hormone laboratory breast cancer research group
- InPreD Cancer Genomics
- Molecular Pathology of Pancreatic Disease
- Tumor Biology Research Group
- Western Norway Familial Cancer center (Regionalt kompetansesenter for arvelig kreft)

Neuro Clinic – Dept of Neurosurgery

- Neurosurgical research
- Paraneoplastic neurological syndromes

Surgical clinic

- Bergen Urological Research Group
- Gastrointestinal surgery research group

Women's Clinic

- Bergen Research Group for Gynecological Cancer
- GenderHealth at VID Specialized University
- Innovative Novel Ovarian Cancer Treatment Approaches (INOVA)

Overview of central/regional research support, core facilities and infrastructures



*) For more information on core facilities and infrastructures, see plan for research and innovation page 12

Key Indicators in Cancer Research 2024



Completed Ph.D degrees:

16



Research budget (estimate)

€13.9 M



Number of new patients included in clinical trials:

174



Approx. Total number of FTEs in cancer research:

84



Total number of peer-reviewed publications (with HUS first, second or last author)

165 (82)



Number of active clinical trials:

78

Number of publications with impact factor >10 (with HUS first, second or last author)

19 (3)

Presentation of the research groups at Haukeland CCC

Anaesthesia and Surgical Services:

Research Group for Palliative Care

Website: [Research Group for Palliative Care | UiB](#)

Research Group Leader: Margrethe Aase Schaufel

Number of Group Members: 15

Research Focus in short:

- Incurable cancer, currently a special focus on lung cancer
- Clinical research and health services research

Research Focus:

Communication and decision-making in life-threatening disease, ethics, pain and pain management, palliative surgery, organisation of palliative care services, and end-of-life care.

Current Projects:

- SCAN-ONC (Scalable Natural Language Processing for Tracking Clinical Data and Improving Healthcare in Oncology): a study applying NLP technology already implemented in healthcare systems in the United States which we will modify to the Norwegian language and documentation styles, validate, and operationalise to identify four domains of text-based data: 1) Pathology reports; 2) Symptoms and treatment toxicities; 3) Goals of care conversations; and 4) Palliative care quality indicators. We will focus the study on non-small cell lung cancer (NSCLC) because of the high mortality rate of lung cancer, and NSCLC being the most common type of lung cancer. Our long-term goal is to create scalable strategies that provide improved tracking of patient data to support clinical practice, future research and quality improvement.
- iLIVE: Live well, die well. A research program to support living until the end. International multicenter study with participants from 13 countries. In Norway, two hospitals and a nursing home participate. The overall objective is to contribute to better care for the dying, by exploring the worries, expectations and choices of seriously ill and dying patients and their relatives.
- SAMKOM (SAMhandling om forhåndssamtaler i KOMmune- og spesialisthelsetjenesten/Collaboration on Advance Care Planning in Municipal and Specialist Health Services – an Implementation Study). A study investigating key factors and strategies for successful and sustainable Advance Care Planning collaboration between specialist palliative care, oncological care and the municipal health service. We will report findings regarding both implementation outcomes, health services outcomes and health outcomes.
- SAMVAL (SAMval Ved Avansert Lungekreft/ Improving decision-making and patient trajectories in advanced lung cancer treatment – a multicentre implementation study): investigating how to improve patient involvement and information exchange in treatment decisions about advanced lung cancer, especially when it is uncertain whether

further tumour-directed treatment will be beneficial. After initial sub-projects, a pilot has been conducted combining oncogeriatric screening and communication training, studying whether this can increase the degree of shared decision-making and contribute to better palliative care trajectories.

Highlights for 2023/2024:

- SCAN-ONC: granted strategic research funding from Helse Vest (19,8 mill NOK)
- iLIVE: A volunteer training program to support dying patients and their families in hospital has been developed and implemented, and a Core Outcome Set for studies in the dying phase has been agreed upon. 10 papers published so far.
- SAMKOM: research grant from Helsefellesskapet (2 mill NOK)
- SAMVAL: data collection completed, publication in Lung Cancer

Cancer Clinic

ART-FORSEE - Network in adaptive radiotherapy for novel treatment strategies

Research Group Leader: Grete May Engeseth

Number of Group Members: 5 senior researchers, 4 PhD students (to be hired in 2025). A total of 22 people is part of the network including researchers, user representative, clinicians and study personnel

Research Focus in short:

- Adaptive proton therapy
- Proton Relative Biological Effectiveness
- Head and neck cancer, Lung cancer, palliative radiotherapy
- Translational and clinical research

Research Focus:

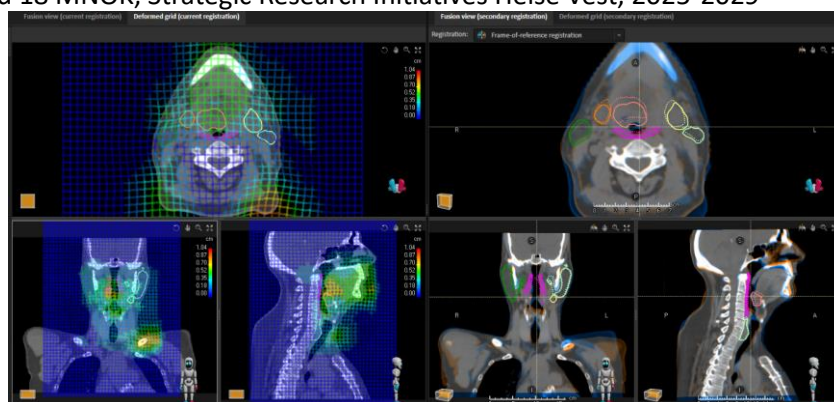
Adaptive radiotherapy (ART) enhances precision by accounting for anatomical changes during radiotherapy. ART-FORSEE advances adaptive proton therapy across multiple disease sites, aiming to reduce toxicity, enable dose escalation, and address uncertainties in proton range and Relative Biological Effectiveness. The project also investigates ART integration in clinical trial design and the feasibility of same-day palliative ART. Through clinical studies, in-silico simulations, and workflow innovation using automation, imaging, and biological modelling, ART-FORSEE will generate evidence to support broader clinical adoption of ART.

Current Projects:

- Adaptive proton therapy for toxicity reduction in head and neck cancer
- Adaptive proton therapy in lung cancer
- Addressing variability in proton beam range and RBE in ART
- Impact of online adaptations on clinical trial design

Highlights for 2023/2024:

- Granted 18 MNOK, Strategic Research Initiatives Helse Vest, 2025-2029



Evaluation of deformed image registration on weekly verification CT.

Bergen radiotherapy research group

Research Group Leader: Liv Bolstad Hysing

Number of Group Members: 9

Researchers:

Grete May Engeseth (HUS/OsloMet)

Sara Pilskog (HUS/UiB)

Camilla Stokkevåg (HUS/UiB)

Liv Bolstad Hysing (HUS/UiB)



PhDs:

Johannes Tjelta, Andreas Handeland, Johanna Hundvin, Anna Milde Bekkevoll, Marianne Hannisdal

Research Focus in short:

- Radiotherapy of Head and Neck, Childhood, Lung, Brain, Prostate and Rectal cancer as well as palliative care
- Translational (both biological and technological)
- Clinical studies

Research Focus:

Radiotherapy is a critical modality for cancer treatment, either as a standalone therapy or in combination with other treatments. Our research focuses on combating cancer through radiotherapy and particle therapy. We employ models, imaging, and in-silico simulations in our translational research to develop improved treatment strategies. Investigating the biological response to radiotherapy, including its effects and side effects, is a key area in both our translational and clinical studies. Additionally, we conduct interventional radiotherapy studies and develop predictive dose-response models. Our research impacts the treatment of various cancer patients, aiming to cure cancer, prolong life, or relieve pain.

Current Projects:

- [TNT-RECORD: a clinical and translational study for rectal cancer](#)
- [NOVO: innovation research for dose verification in proton therapy](#)
- [PulmDIBH: simulation studies for improving radiotherapy for lung cancer](#)
- [NTCP: Late effects and patient selection to proton therapy for head and neck cancer patients](#)

Highlights for 2023/2024:

- PhD Øyvind Lunde Rørtveit 13.6.2023 «Bayesian modelling of organ deformations in radiotherapy»
- PhD Kristine Fjellanger 19.03.2024 "Improving photon and proton radiotherapy of locally advanced non-small cell lung cancer"
- First patient treated with online adaptive radiotherapy (Ethos) in the TNT-RECORD study (NCT05883800)
- First EU innovation grant with HUH as partner with the NOVO-project (No. 101130979)

Brain Tumour Research Group

Research Group Leader: Dorota Goplen

Number of Group Members: 5

Research focus in short:

- Clinical phase IB/II trial on recurrent glioblastoma
- Investigation of novel biomarkers in high grade glioma
- Assessment of the potential role of particle radiotherapy in IDH mutated glioma.

Research Focus:

The BORTEM-17 clinical trial has recruited 62 of the planned 63 patients. The preliminary data and interim analysis were presented at ASCO and SNO. The results are planned to be published in 2026-2027.

Glio-Plate is an observational, prospective study of the platelet proteome and its potential role in diagnostics of high-grade glioma. The study revealed an altered platelet protein expression in tumour bearing patients compared to health individuals. The results are planned to be published soon.

Preliminary results were presented at AACR in 2024.

PRO-GLIO is a multicentre international study with the primary objective is to show that proton therapy is non-inferior to photon therapy for patients with IDH-mutated diffuse grade 2 and 3 gliomas

Current Projects:

- All projects are currently ongoing. BORTEM-17 is planned to be completed in 2025. The recruitment to Glio-Plate is closed and the analysis is ongoing.
- The Pro-Glio is open and recruiting.

Highlights for 2023/2024:

Presentations:

1. Markhus V, Selheim F, **Goplen D**. Poster presentation at The Festival of Genomics and Biodata in London January 2024: Rapid and Effective Isolation of Human Platelets from Whole Blood: Maximizing Purity for Evaluating Proteomics Methods in Clinical Studies for Cancer Patients
2. Rahman MA, **Goplen D**, Waha A, Oltedal L, Haasz J, Miletic H, Selheim F, Chekenya M. Poster presentation AACR 2024: Biological mechanisms underlying objective responses in recurrent GBM patients treated with sequential Bortezomib and Temozolomide: An Interim analysis of NCT03643549 Phase IB/II trial.
3. **Goplen D**, Rahman MA, Brekke J, Kumar S, Arnesen V, Birkeland E, aha A, Marienhagen K, Oltedal L, Haasz, J, Miletic H, Selheim F, Solheim TS, Brandal P, Lie SA, Chekenya M, Poster presentation SNO 2024: NCT03643549 Phase IB/II trial: Efficacy, safety, and biological mechanisms of objective responses in recurrent GBM patients with unmethylated MGMT promoter treated with sequential Bortezomib and Temozolomide
4. Markhus V, Fritz-Wallace K, Mjaatavatn O, Kristoffersen EK, Mahesparan R., Selheim F, **Goplen D**. Poster presentation at EACR 2025: Differential protein expression in platelets collected from glioma patients and healthy controls: A Comparative Study
5. Markhus V, Fritz-Wallace K, Mjaatavatn O, Kristoffersen EK, Mahesparan R., Selheim F, **Goplen D**. Poster presentation at EACR 2025, The Pivotal Role of Exosomes in Crosstalk between Glioma cells and Platelets.

Cancer Caregiver Research Group

Pårørendeforskning i Kreftomsorg (PaFKO)

Research Group Leaders: Kari Britt Hagen and Karen Gissum

Number of Group Members: 5

Research Focus in short:

- Caregivers of cancer patients
- The need of caregivers during the cancer trajectory
- Clinical practice improvement
- Patient-centred information tools

Research Focus:

Our research is on family caregivers of cancer patients. Next of kin are an essential part of the patient's healthcare journey and should receive appropriate support and guidance. For caregivers, this often means feeling valued, being listened to, and being included as part of the care team, to the extent that the patient wishes and consents.

Caregivers often experience anxiety, depression, and stress, sometimes at higher levels than patients themselves. Psychological distress mediates the relationship between caregiver burden and quality of life (QoL). Also sleep disturbances, physical health decline, uncertainty, and social isolation contribute to mental strain.

In Norway there are few studies examine how caregivers are systematically included in cancer care pathways. Also, research often focuses on spouses; less is known about other family members or younger caregivers. In addition, few studies explore financial strain, sick leave, and career changes among caregivers in Norway.

Our focus is:

Integration into healthcare systems: Formal recognition of caregivers as part of the care team.

Technology-based support: Digital tools for education, communication, and stress management.

Longitudinal studies: Understanding long-term psychosocial and economic consequences.

Current Projects:

- Qualitative research on relatives of breast cancer patients. One article is ready for submission, while the second article is scheduled for submission in spring 2026.
- We plan to expand the project into a prospective study collecting both qualitative and quantitative data.

Highlights for 2024/2025:

- Poster at the National Conference on Cancer Nursing 2025

The Norwegian Cancer Origin Research Group (NorCORG)

Research Group members:

MD PhD Eli-Sihn Samdal Steinskog, MD PhD Kristine Aasebø, MD PhD Kjersti Elvestad Hestetun, MD PhD Kjersti Tefre Davidsen, MD PhD Hilde Ytre-Hauge Smeland, MD PhD Gry Sandvik Haaland.

Research focus in short:

Improved diagnostics and treatment approach for patients with advanced cancer of unknown origin (CUP)

Research focus:

CUP is a rare cancer disease with poor prognosis with few treatment options. However, improved diagnostics with comprehensive molecular profiling has shown promising results regarding improved survival with a more personalised treatment approach. The group focuses on translational research to improve diagnostics, treatment, and outcomes for CUP patients by integrating clinical oncology, molecular profiling, pathology, and artificial intelligence. NorCORG collaborates closely with **InPreD**, **IMPRESS-Norway**, **Mohn lab**, **Cancer Genomics**, and **Patologi i Vest**.

Current projects:

- RETRO-CUP: Retrospective study of diagnostics, treatment and outcome of CUP patients in Norway between 2010-2020
- The NorCUP trial: A national trial analysing the impact of comprehensive tumour molecular profiling and implementation of CUP molecular multidisciplinary team meeting (MDT) for CUP patients
- CUP-AID: Cancer of Unknown Primary – Artificial Intelligence, Integrated Diagnostics & Decision Support.

Highlights 2023/2024:

Received the Norwegian Cancer Society open project grant in 2024.

Ongoing grants:

The Norwegian Cancer Society open project grant (2024)

The Trond Mohn Foundation grant (2025)

Melanoma research group

Research Group Leader: Oddbjørn Straume

Number of Group Members; 5 Researchers:

Oddbjørn Straume (Professor, Director of the Cancer Clinic)
Cornelia Schuster (MD PhD, Senior Consultant Oncology)
Kjersti Tefre Davidsen (MD PhD, Senior Consultant Oncology)
Austin J Rayford (MsSc PhD)
Franziska Görtler (Bioinformatician, PhD)

Associated senior clinicians

Sindre H Molvær and Liv- Iren H Vinnem

Collaborators

Prof. Daniela Costea, Prof. Bjørn Tore Gjertsen, Prof. James B Lorens, Prof. Doug Lauffenburger, Prof. Anette Wolff, Prof. Silje Skrede, MD PhD Tormod Guren, Prof. Jon Kyte, Prof. Lars A Akslen, MD PhD Sura Azis

Research focus in short

Biomarkers for response and side effects to checkpoint inhibitors
Deep multiparametric profiling

Research Focus

Immunotherapy with check point inhibitors have revolutionized the management of difficult- to treat cancers like melanoma. However, this treatment comes with a high risk of severe autoimmune side effects that are detrimental to the patients' health and quality of life, and about half the patients do not respond to the therapy. In our research we leverage advanced deep multiparametric profiling (CyTOF and Imaging Mass Cytometry, RNAseq, WES) of melanoma patient biopsies from clinical trials and a retrospective real-world study. The aim is to identify predictive biomarkers for response and serious immune related side effects to immunotherapy with checkpoint inhibitors.

Current Projects

- Deep multiparametric profiling of pretreatment biopsies from melanoma patients (from The Haukeland University Hospital based, randomized Phase Ib/II study BGBIL006 (NCT02872259, PI: O. Straume)
- Imaging Mass Cytometry of melanoma biopsies from a retrospective real-world study and a national phase IV study (IPI4, NCT02068196), PI: T. Guren
- Assessment of immune and stress-response markers in pretreatment tissue samples from IPI4 study (NCT02068196).
- Biobank for immune-related side effects, designed to prospectively collect blood samples at multiple predefined time points and systematically record relevant clinical data. Multiomics, single cell and serum concentration analysis will be performed. Analysis of PD1-serum concentration in melanoma patients (NCT02872259)

Highlights for 2023/2024

- ESMO 2023, Spain: Results from BGBIL006 presented by O. Straume
- Nordic Melanoma Meeting (NMM) 2023, Iceland: Results from biomarker analysis in IPI4 study presented by C. Schuster
- Ethical approval for Biobank for immune related side effects
- Helse Vest post doctoral grant 2024

Mohn Cancer Research Laboratory

Research Group Leader: Stian Knappskog

Number of Group Members:

18

2 Professors

2 Senior scientists

2 Senior oncologists

7 PhD students

4 Technicians

1 Study nurse



Research Focus in short:

- Breast cancer, neuroendocrine carcinoma, colon cancer, melanoma, ovarian cancer, endometrial cancer
- Translational: Genetics/Genomics, epigenetics and clinical trials

Research Focus:

The research group applies large scale molecular analyses (genetic, genomic and epigenetic etc.) within clinical trials, to identify and implement new predictive biomarkers. A particular focus has been on neoadjuvant treatment of breast cancer.

Further translational programs include assessment of intratumor heterogeneity and subclonal dynamics in tumour evolution and during cancer treatment.

A rapidly expanding spin-off project has been initiated based on the finding that embryonic epimutations of *BRCA1* cause an increased risk of breast and ovarian cancer and seem to be the underlying cause of around 20% of all triple-negative breast cancer. We are currently expanding this concept into other tumour suppressor genes and cancer types.

Current Projects:

- Genomic analyses to identify predictive biomarkers for neoadjuvant breast cancer therapy
- Determine the role of embryonic epimutations as underlying causes of cancer
- Map the molecular landscape of rare neuroendocrine carcinoma
- Subclonal dynamics in tumour evolution and response to therapy

Highlights for 2023/2024:

- Discovery of *BRCA1* epimutations as risk factors for breast and ovarian cancer
- Quantifying 20% of all triple-negative breast cancers to be caused by *BRCA1* epimutations
- Detailing homologous recombination deficiency in non-triple-negative breast cancers
- Received major competitive grants from the Research Council of Norway, the Norwegian Cancer Society, the Nordic Cancer Union, the Regional Health Authorities and the Trond Mohn Foundation.

Mohn Cancer Research Laboratory - Digestive High-Grade Neuroendocrine Neoplasms

Group participants

Helse Bergen

Professor Halfdan Sørbye, Cancer Clinic, Haukeland University Hospital

Professor Stian Knappskog, Mohn Cancer Research Laboratory

MD, PhD candidate Siren Morken, Cancer Clinic, Haukeland University Hospital

International participants

Professor Aurel Perren, Institute of Tissue medicine and Pathology, University of Bern, Bern, Switzerland.

Professor Anne Couvelard, Department of Pathology, Bichat Hospital, Paris, France.

PhD MD Seppo Langer, Department of Oncology, Rigshospitalet, Copenhagen, Denmark.

Professor Eva Tiensu Jansson, Section of Endocrine Oncology, Uppsala University, Uppsala, Sweden

Research Focus:

Digestive high-grade neuroendocrine neoplasms consist of well-differentiated neuroendocrine tumours (NET G3) and poorly differentiated neuroendocrine carcinomas (NEC). They are rare but represent a huge clinical unmet need. They usually present with advanced disease, behave aggressively clinically and have a very poor prognosis and short survival with limited treatment options. Molecular markers for classification, treatment selection and prognosis are generally lacking.

We have collected a prospective Nordic Cohort on 800 patients with clinical characteristics, treatment benefit and survival. Most cases have been re-classified according to the new WHO classification. We have collected tumour samples from 250 cases and performed gene sequencing (NGS) on these cases. We have also analysed circulating tumour DNA in 170 plasma samples with the TSO500.

Colorectal NEC has the worst prognosis among digestive NEC. Recurrence after surgery for localized CRC NEC is frequent, with a 30% survival rate compared to 70% for adenocarcinoma. Benefit of palliative chemotherapy is very limited for CRC NEC. The reason why CRC NEC are so more aggressive compared to its adenocarcinoma counterpart is not understood. To investigate this, we have started whole genome analyses on >100 CRC NEC tumour samples and methylation studies are planned. Our results could give important information for classification, for prognosis and for selection of treatment in digestive high-grade NEN patients. It could give a better molecular understanding why some cancers are so aggressive and make the fundament for more personalized patient treatment in the future.

Ongoing grants

- The Norwegian Cancer Society open project grant.
Halfdan Sørbye: Molecular alterations in colorectal neuroendocrine carcinomas (NEC) - identifying potential for new treatments
- European Neuroendocrine Tumour Society (ENETS) synergy grant
Halfdan Sørbye: Multicentric morphological and molecular appraisal of GEP-NEN G3 with clinical correlations.
- Nordic Cancer Union open project grant.

Stian Knappskog: “Neuroendocrine carcinomas (NEC) – a new molecular era for an understudied malignancy”

Seven selected neuroendocrine publications:

Sorbye H, Welin S, Langer SW, Westermark L, Holt N, Osterlund P, Dueland S, Hofslie E, Guren M, Ohrling C, Birkemeyer E, Thiis-Evensen E, Biagini M, Gronbaek H, Soveri LM, Holst I, Federspiel B, Assmus J, Janson ET, Knigge U. Predictive and prognostic factors for treatment and survival in 305 patients with advanced gastrointestinal neuroendocrine carcinoma (WHO G3): The NORDIC NEC study. *Ann Oncol* 2013, 24: 152-160.

Venizelos A, Elvebakken H, Perren A, Nikolaienko O, Deng W, Lothe IMB, Couvelard A, Hjortland GO, Sundlöv A, Svensson J, Garresori H, Kersten C, Hofslie E, Detlefsen S, Krogh M, Sorbye H*, Knappskog S*. *Shared last authorship. The molecular characteristics of high-grade gastroenteropancreatic neuroendocrine neoplasms. *Endocr Relat Cancer*. 2021 Nov 11;29(1):1-14.

Morken S, Langer S, Sundlov A, Vestermark L, Ladekarl M, Hjortland G, Johanna Svensson, Tabaksblat E, Haslerud T, Aßmus J, Detlefsen S, Couvelard A, Perren A, Sorbye H. Phase II study of everolimus and temozolomide as first-line treatment in metastatic high-grade gastroenteropancreatic neuroendocrine neoplasms. *Br J Cancer*. 2023 Dec;129(12):1930-1939

Elvebakken H, Perren A, Scoazec JY, Tang LH, Federspiel B, Klimstra DS, Vestermark LW, Ali AS, Zlobec I, Myklebust T, Hjortland GO, Langer SW, Gronbaek H, Knigge U, Jansonh ET, Sorbye H. A consensus developed morphological re-evaluation of 196 high-grade gastroenteropancreatic neuroendocrine neoplasms and its clinical correlations. *Neuroendocrinology*. 2021;111(9):883-894.

Dasari A, Shen C, Devabhaktuni A, Nighot R, Sorbye H. Survival According to Primary Tumor Location, Stage, and Treatment Patterns in Locoregional Gastroenteropancreatic High-grade Neuroendocrine Carcinomas. *Oncologist*. 2022 Apr 5;27(4):299-306.

Sorbye H, Grande E, Pavel M, Tesselaar M, Fazio N, Reed NS, Knigge U, Christ E, Ambrosini V, Couvelard A, Tiensuu Janson E. European Neuroendocrine Tumor Society (ENETS) 2023 guidance paper for digestive neuroendocrine carcinoma. *J Neuroendocrinol*. 2023 Mar;35(3): e13249.

Sorbye H, Hjortland G, Ladekarl M, Tabaksbalt E, Pfeffer P, Elvebakken H, Perren A, Couvelard A, Lothe IMB, Hjortland GO, Svensson J, Garresori H, Kersten C, Hofslie E, Jansson ET, Assmus J, Sundlov A, Vestermark LW, Morken S, Knigge U, Langer SW. Characteristics and treatment outcome in a prospective cohort of 639 advanced high-grade digestive neuroendocrine neoplasms (NET G3 and NEC). The NORDIC NEC 2 study. *Br J Cancer* 2025 in press

Sarcoma group Haukeland University Hospital

Research Group Leader: Nina L. Jebsen, consultant oncologist Haukeland University Hospital, PhD, associate professor University of Bergen

Number of group members: Representatives from Deps. of Orthopaedic surgery, General surgery, Paediatric medicine, Gynaecology, Radiology, Pathology



Research focus in short:

- Bone- and soft tissue tumours
- Clinical studies

Research Focus:

Research areas: Local recurrence in extremity and trunk wall soft tissue sarcoma, prognostic factors and impact of adjuvant radiotherapy, observational studies. Late effects following surgery and radiotherapy in extremity and trunk wall soft tissue sarcoma, evaluation during clinical follow-up
Clinical trials and treatment protocol collaboration:

- Scandinavian Sarcoma Group treatment protocols in soft tissue sarcoma with neoadjuvant or adjuvant chemotherapy and radiotherapy (SSG XX, Neo-STS)
- International collaboration in clinical trials in bone sarcoma with pre- and postoperative chemotherapy (Euramos 1, EUROBOSS, rEECur)

Current Projects:

- Adjuvant chemotherapy in high-risk soft tissue sarcoma in extremities and trunk wall
 - Neo-STS: Preoperative chemotherapy in high-risk soft tissue sarcoma in extremities and trunk wall
 - SSG XX: A Scandinavian Sarcoma Group treatment protocol for adult patients with non-metastatic high-risk soft tissue sarcoma of the extremities and trunk wall
- Myxoid liposarcoma
 - DOse REduction of preoperative radiotherapy in MYxoid liposarcomas.
 - International prospective registry on local treatment approaches in myxoid liposarcomas
- Precision medicine in paediatric oncology with focus on osteosarcoma and neuroblastoma (PICCA2, PERCAP)
- Late morbidity and health related quality of life after surgery and radiotherapy for extremity localized soft tissue sarcoma. A Scandinavian Sarcoma Group (SSG) project

Highlights for 2023/2024:

- 6th May 2023: (biannual) Sarcoma Day, organized by The Sarcoma Centre in collaboration with the Western Norway patient union for Sarcoma. Patients, relatives, and health personnel involved in sarcoma care were invited to a conference focusing on development in sarcoma treatment, physical and psychological late effects of therapy, and current research aspects
- The Sarcoma Centre at HUS has contributed to the preparation and revision of national guidelines for the investigation and treatment of sarcoma, revised in 2023 and 2024
- 4. – 5. April 2024 Representation and lectures at Norwegian Sarcoma Group Meeting with focus on development of sarcoma therapy and pathology assessment methodology
- 2024-2024 and ongoing: Representation in the national proton project, establishing a national registry om proton- and radiotherapy, piloting development of structured Electronic Patient Records in sarcoma treatment for secondary use of data for quality assessment and research

Other research projects within the Cancer Clinic

PhysCan Study

Investigates the effects of supervised physical training on muscle cellular outcomes, muscle function and physical fitness in breast cancer patients undergoing adjuvant chemotherapy and whether exercise intensity moderates this effect. Data will inform exercise guidelines to reduce late effects of treatment. Collaborations include the Norwegian School of Sport Sciences, University of Agder and Uppsala University.

- **Ongoing doctoral theses (UiB) within the PhysCan study:**
Effects of exercise on muscle metabolism in breast cancer patients.
PhD candidate: Tor-Helge Wiestad, The unit for Cancer Rehabilitation, Cancer Clinic.
Main supervisor: Truls Raastad, Department of Physical Performance, Norwegian School of Sport Sciences, Oslo, Norway.

Children and Youth Clinic

Oral Late Effects after Childhood Cancer Treatment Research Group

Research Group Leader: Dorota M. Wojcik MD, PhD, senior consultant, Paediatric Oncology/Haematology, Haukeland University Hospital

Number of group members:

5 - Representatives from Departments:

- Clinical Dentistry, University of Bergen, Department
- Oral and Maxillofacial Surgery, Haukeland University Hospital
- Paediatrics, haematology/oncology, Haukeland University Hospital

Research focus in short:

The long-term oral and craniofacial complications following treatment of various types of cancer in children and clinical research.



Research Focus:

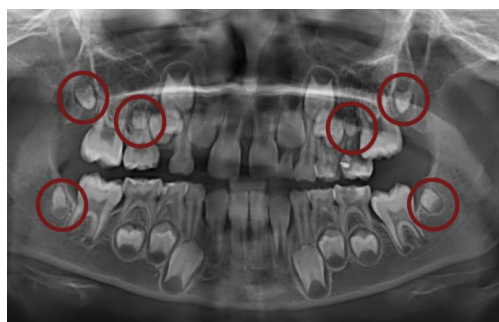
The research group investigates the long-term oral and craniofacial complications following treatment for childhood cancer, including chemotherapy, radiation, and surgery. The focus is on identifying the prevalence and severity of dental developmental disturbances, caries, malocclusion, salivary dysfunction, and craniofacial growth anomalies. The group utilises clinical and radiographic examinations, statistical analyses, and longitudinal follow-up to improve diagnostics, early interventions, and follow-up guidelines, aiming to enhance oral health and quality of life for survivors.

Current Projects:

Development and growth of the face, jaws and teeth, and assessment of oral health in children aged 0–18 years after treatment for childhood cancer.

Highlights for 2023/2024:

- Completion of clinical data collection from 97 paediatric cancer survivors treated between 2017–2021.
- Initiated comparative analysis with a healthy control group of 194 children.
- Secured 1.3 million NOK grant from the Norwegian Childhood Cancer Association.
- Presentation of results at the NOPHO-congress in Tallinn 2024 and at the International Association for Disability and Oral Health in Seoul, 2024.
- 'Coping week' for childhood cancer survivors. Education for parents about oral late effects after childhood cancer and training in oral hygiene for children. (March and October 2023 and February and November 2024)



Pediatric Oncology Research Group at Haukeland University Hospital

Research Group Leader: Maria W. Gunnes

Number of Group Members: 10 Maria W. Gunnes, Ingrid K. Torsvik, Anita Andrejeva, Dorota Wojcik, Christin Thaulow, Anna Luijendijk, Elisabeth Rotevatn, Szymon Klafkowski, Silje K. Eliassen, Line B. Haga

Research Focus:

The whole spectrum of childhood cancer, with focus on supportive treatment as well as rare/refractory cancer, in particular neuroblastoma. Clinical research as well as translational research with spheroids and PDX's and drug testing, proteomics, and immunotherapy (CAR-T for osteosarcoma and neuroblastoma). We work to make cancer treatment for children better, safer, and more precise. Through clinical studies, we investigate new medicines and treatment methods, and how these can be tailored to each individual child.

We focus especially on:

- Personalized medical treatment with chemotherapy, immunotherapy, and other targeted medicines
- Monitoring minimal residual disease (MRD) to detect early relapse in solid tumours (“liquid biopsy”)
- Pharmacokinetics and pharmacogenomics in paediatric patients
- Long-term effects and follow-up of survivors of childhood cancer

We use modern technologies such as genetic sequencing and flow cytometry, and collaborate with other researchers in Norway and internationally.

Our goal is to help more children survive cancer, experience fewer side effects, and enjoy a better quality of life after treatment.

Current Projects:

- “Better antibiotic treatment for children with cancer”- Christian Thaulow
- “Improved Diagnosis and treatment of childhood cancer “-Maria W. Gunnes/ Lars Herfindal/ Reidun Æsøy
- “Personalized Immunotherapy”- Maria W. Gunnes/Sebastien Walchli (OUS)
- Development and growth of the face, jaws, and teeth, and assessment of dental health in children aged 0–18 years after treatment for childhood cancer. Dorota Wojcik

Highlights for 2023/2024:

- Secured further funding for projects
 - “Precision medicine/Improved diagnosis and treatment for childhood cancer”
 - “Better antibiotic treatment for children with cancer”
- Hosted the national annual meeting on Paediatric cancer research and precision Medicine in Bergen (fall 2024)

Department of Internal Medicine – Haematology

PRECOS

Research Group Leader: Emmet Mc Cormack

Number of Group Members: 17

Research Focus in short:

Cancer, immunotherapy, preclinical development, molecular imaging

Research Focus:

The group's core activities focus on the development, characterization, and application of clinically relevant models (patient-derived xenografts (PDX), Hu-PDX) and multimodal molecular imaging strategies, and how judicious application of these technologies can expedite clinical development of novel therapeutics. More recently, the group has focused on the development of novel immunotherapies (CAR-T and BiTees), both supporting clinical trial efforts in the evaluation of CAR-T therapies and development of our own CAR T constructs and bispecific T cell engagers for paediatric and canine applications in collaboration with OUS.

The finding that sonoporation impacted the growth of PDAC in preclinical models was successfully translated to the clinic, resulting in a major improvement of clinical outcome (17.6 vs. 8.8 months). KinN Therapeutics AS' preclinical collaboration with Celgene (now BMS) on the compound CC90009 resulted in a clinical trial and one cure (to date) for a patient with AML. Preclinical development of vididencel by scientists at PreCOS and KinN Therapeutics AS led to a clinical trial of this DC based vaccine by Mendus AB. Currently, vididencel has reached phase II. The group demonstrated the preclinical activity of tebentafusp, a bi-specific gp100 targeted T cell receptor protein (Mc Cormack et al., Cancer Immunol. Immunother. 2012) in collaboration with Immunocore. KIMMTRAK is now approved for HLA-A*02:01-positive metastatic or unresectable uveal melanoma. Fosse et al., BMC Med. 2023 outlines recommendations for robust and reproducible preclinical research in personalized medicine and is anticipated to increase the impact of preclinical research. The group is associated member of the NFR SFF CanCELL, the Norwegian centre for Molecular Medicine and working group 2 leaders in the Immunomodel

Current Projects:

- **AMIDE:** In the **NFR FRIPRO** project we explore the development of an immune avatar patient derived xenograft mouse model to predict the efficacy and toxicities related to CAR T cell therapy in addition to development of innovative CAR T cell designs to offset CAR T cell exhaustion in solid cancers, while the **MyCAR project funded by Helse Vest** aims to develop a new immunotherapy for Myelodysplastic syndrome patients based on CAR T cell technology
- **IIDEA:** This project **funded by the Norwegian cancer society** aims to develop an immune avatar PDX (iaPDX) - using CD34+ cells and thymus epithelium cells (TEC) derived from patient induced pluripotent stem cell (iPSC) line, in addition to developing armored CAR-T cell constructs
- **PedHemaCAR and PERCAP:** Both projects are **funded by Barnekreftforeningen** (the children's cancer society) to develop novel preclinical models and immunotherapies of paediatric cancers with the aim of accelerating clinical translation.

- **CodaFLIGHT:** This **EIC pathfinder grant** is a European collaboration on the development of a time-domain fluorescence guide surgery platform.

Highlights for 2023/2024:

- **Gelebart *et al.* Blood. 2023 Oct 26;142(17):1478-1493.** The role of Axl has been associated with promoting cell proliferation (through the PI3K/Akt and MAPK/ERK pathway), inhibition of apoptosis, metastasis, invadopodium formation, angiogenesis, immune evasion, resistance to therapy, and influencing the tumour environment. Axl has also been described as a potential prognostic marker in multiple cancers including ovarian-, pancreatic-, breast and lung cancer. In this study, we report the identification and expression of a new isoform splice variant of the tyrosine kinase receptor AXL in MCL cells. This new AXL isoform, called AXL3, lacks the ligand-binding domain of the commonly described AXL splice variants and is constitutively activated in MCL cells. Interestingly, functional characterization of AXL3, using CRISPR inhibition, revealed that only the knock down of this isoform leads to apoptosis of MCL cells. Importantly, pharmacological inhibition of AXL activity resulted in a significant decrease in the activation of well-known proliferative and survival pathways activated in MCL cells (ie, β -catenin, Akt strain transforming, and NF- κ B). Therapeutically, preclinical studies using a xenograft mouse model of MCL indicated that bemcentinib is more effective than ibrutinib in reducing the tumour burden and to increase the overall survival. Our study highlights the importance of a previously unidentified AXL splice variant in cancer and the potential of bemcentinib as a targeted therapy for MCL
- **Caulier *et al.* Cell Rep Med. 2024 Jun 18;5(6):101572 and Casey *et al.* J Immunother Cancer. 2024 Apr 11;12(4):e008179.** Both articles have resulted from our collaboration with Sébastien Wälchli and Else Marit Indeberg's lab at OUS. **Caulier *et al.*** Describes the preclinical development of a CD37 CAR-T in Acute myeloid leukaemia (AML) with a clinical trial exploring the efficacy of CD37 CAR now being trialled at Haukeland University Hospital in Bergen. **Casey *et al.*** A promising candidate for CAR T development in ovarian cancer is the MUC16 ectodomain. This ectodomain remains on the cell surface after cleavage of cancer antigen 125 (CA125). In this study, we examined the suitability of the CA125 as a target for CAR T cell therapy in collaboration with OUS and Prof. Line Bjørge. Our in vitro and in vivo results, including PDX studies, demonstrate that the CA125 domain of MUC16 represents an excellent target for treating MUC16-positive malignancies.
- **Safont *et al.* STAR Protoc. 2024 Dec 20;5(4):103522.** Patient-derived xenograft (PDX) models of acute myeloid leukaemia (AML-PDX) offer advantages over cell line models by capturing the complexity and heterogeneity of patient-derived samples. Here, we present a protocol for developing a bioluminescent AML-PDX model in mice to evaluate chimeric antigen receptor (CAR) T cell therapy. We describe steps for transducing, engrafting, expanding, and enriching AML-PDX cells. We then detail procedures for in vitro and in vivo validation of the AML-PDX model for the evaluation of CAR T cell immunotherapy.

The Signalling-Targeted Research Group

Research Group Leader: Professor Bjørn Tore Gjertsen

Number of Group Members: 24 including master students.

Research Focus in short:

Single cell functional profiling, early identification of non-responders, tumour clonality, cell fates, single cell immune profiling, single cell signal profiling, companion diagnostic, Acute Myeloid leukaemia (AML), Chronic Myeloid Leukaemia (CML), p53, CD37CAR-T Repurposing of drugs in cancer, Clinical trials, mass cytometry, RNA single cell sequencing.

Research Focus:

The Signalling-Targeted Research Group focuses on single cell immune and signalling profiling, aiming to early distinguish therapy responders from non-responders, as well as to identify new potential drug targets for therapy development in AML and CML.

The research group is a part of the KG Jebsen Centre for Myeloid Blood Cancer (C-MYC) since September 2024. The centre is focused on establishment and validation of new single-cell technologies, including mass cytometry and single cell sequencing, to delineate the molecular dynamics of cancer cells at diagnosis and longitudinally during therapy. The Centre is also engaged in outreach to secure a larger biobank with biomaterials from clinical trials and aimed to recruit and offer more leukaemia patients to participate in clinical trials. The C-MYC centre plays a key role in moving forward in myeloid blood cancer research through strengthening our collaboration with leukaemia focused research groups in other Nordic and European countries. Treatment of leukaemia has previously shown the way in the development of targeted treatment with chemotherapy tablets, and advanced immunotherapy and cell therapy. The centre will build on these experiences and the researchers hope that the final delivery will be new diagnostics and groundbreaking treatments that can make a clear difference for people with cancer.

We believe that development of companion diagnostics through single-cell profiling will improve personalized precision therapy for AML patients. The group's results indicate that the pERK1/2 pathway and p53 protein and signalling modulation, could be candidates for companion diagnostics (Tislevoll *et al.*, 2023). The research group recently received funding from the Norwegian Cancer Society for collecting longitudinal blood samples from all AML patients in the Nordic countries, to verify these findings.

The research group has several self-initiated clinical trials, as well as being involved in trials initiated at other sites, both in Norway and abroad. From all clinical trials, we are collecting samples for our general biobank.

The project "Single-cell immune profiling in cancer" aims to show the potential of single-cell profiling in cancer prognostication and response evaluation, based on biobanked peripheral blood in small clinical trials. Immune profiling with intracellular signalling demonstrates that AML patients in complete remission are very different from healthy individuals. Also, imaging mass cytometry are being used to analyse skin biopsies from AML patients treated with a dendritic cell vaccine in a Phase1/2 clinical trial performed in collaboration with MENDUS, to examine the mechanisms involved in vaccine-triggered T cell responses.

One subproject is drug repurposing in AML. Our preliminary data indicate clinical benefit of the combination Valproic acid and Quinacrine especially in patients carrying TP53 mutations, a subgroup

with high unmet need. The concept will be developed in advanced cancer with genetic profiles predicting low survival. Another subproject focuses on the tumour suppressor p53 protein profiling in cancer. Profiling of p53 isoforms and posttranslational modification in single cells are being developed and connected to the signalling state and phenotype of the cell.

Cellular immunotherapy through allogeneic hematopoietic stem cell transplantation is highly effective to avoid relapse in AML, but is limited by adverse effects. We are therefore developing the first Norwegian designed and produced Chimeric Antigen Receptor (CAR) T cell therapy, employing the immune cell restricted target CD37. CD37 is a unique target with reduced anticipated adverse effects. Preclinical evidence of the anti-leukemic efficacy of the CD37CAR in *in vitro* and *in vivo* models of AML have laid the foundation for a phase I first-in-man dose finding study of the CD37CAR. In this trial, which includes all the four University Hospitals in Norway, we will enrol 8 AML patients meeting the criteria of being in first complete remission but with positive measurable residual disease and CD37 positive at diagnosis.

Current Projects:

- Early therapy response evaluation for prediction of clinical outcome. Collection of longitudinal peripheral blood samples from AML and CML patients in the Nordic countries for verifying the findings published in Tislevoll *et al.* Nature Communication 2023.
- Initiation of a Phase 1 CD37CAR-T clinical trial in patients with AML
- Development of antibody panels for CyTOF and imaging mass cytometry for analysing Peripheral blood and bone marrow biopsies from AML patients
- Use already establish mass cytometry and antibody panels to analyse collected blood and bone marrow sample from several clinical studies in AML, CML, Melanoma, and colon cancer

Highlights for 2023/2024:

- Most important results are that single cell profiling of peripheral blood leukocytes seems to include information about the prognosis and predict the therapeutic effect of cancer therapy. By monitoring intercellular signalling pathways, transcription factors and cell death regulators, response is possible to determine after hours and days rather than conventional response evaluation after weeks and months. If the patient is a non-responder, therapy can be adapted or replaced weeks or months before the current standard of care.
- Granting of the KG Jebsen Centre for Myeloid Blood Cancer
- Granting of research funds from the Norwegian Cancer Society
- Publication of the paper: Tislevoll BS et al. Early response evaluation by single cell signalling profiling in acute myeloid leukaemia. Nature Communication, 2023. PMID:36611026

Department of Radiology

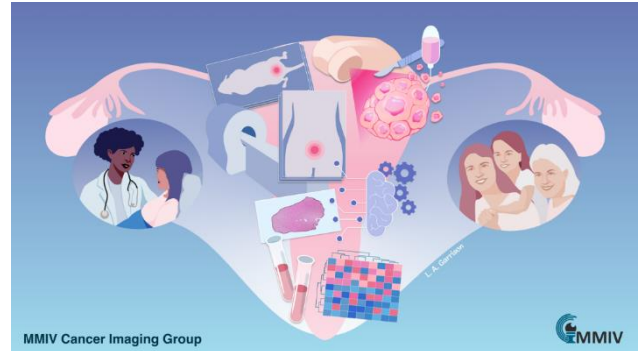
Bergen Cancer Imaging Research Group

Research Group Leaders: Ingrid S. Haldorsen (PI) and Kristine E. Fasmer (co-PI)

Number of Group Members: 8

Research Focus in short:

- Gynaecological cancer
- Translational and clinical research



Research Focus:

Gynaecologic cancers exhibit distinct structural and functional imaging characteristics that are associated with clinical phenotypes. Our multidisciplinary team integrates MRI and PET/CT with molecular and genetic data aiming to develop more precise and targeted treatment strategies. We conduct translational research bridging preclinical imaging studies to clinical applications to identify and validate novel imaging biomarkers. By developing machine learning tools for automated tumour segmentation and radiomic tumour profiling, we aim to personalize therapy and improve patient outcomes through more accurate and predictive imaging diagnostics.

Current Projects:

- AI-driven tumour segmentation to enhance gynaecological cancer diagnostics
- MRI- and FDG PET/CT radiomic tumour profiling for predicting aggressive disease and poor outcome
- Multiparametric MRI and FDG PET/CT for improved preoperative staging
- Translational multimodal imaging studies linking radiologic features to early treatment response and histopathological tumour characteristics

Highlights for 2023/2024:

- 23 peer-reviewed scientific papers
- Two PhD dissertations and six medical master's theses completed
- 18 oral- and poster presentations at international conferences
- Secured new research funding for two postdocs, three PhDs, and expanded AI-driven imaging projects

Bergen Tracer Development Centre, part of 180 °N

Research Group Leaders: Tom Christian Holm Adamsen (PI), Bengt Erik Haug (co-PI), Erwan Le Roux (co-PI)

Number of Group Members: 7 (in Bergen)

Research Focus in short:

- Radionuclide production, chelator chemistry and bioconjugation
- Clinical translation of novel tracers

Research Focus:

⁴⁵Ti is a novel radionuclide with about 3 hours half-life and beneficial decay characteristics for positron emission tomography. The current landscape of PET radionuclides is in short of medium-short lived radionuclides for biological processes that exhibit slower biological uptake or blood pool clearance. Titanium cations in aqueous media is known to be unstable creating titanyl species that prevents its widespread use as a PET tracer. The research focus is thus focused on the design and synthesis of titanium specific chelators conjugated to biological vectors of interest. In order to provide a bigger toolbox in PET imaging a part of the research focus is also to streamline tracer production with a multi-centre collaboration (Bergen, Tromsø and Trondheim) The Bergen Tracer Development Centre is a part of 180 °N, Norwegian Nuclear Medicine Consortium (www.180N.no).

Current Projects:

- Group (IV) element specific chelators for bioconjugation
- Tracers for Quantitative GFR Kidney Imaging
- Carbonylation ([¹¹C]CO) of tracer candidates for the cysteine/glutamate antiporter system xc-
- Multicentre Implementation of Clinical PET Radiopharmaceuticals

Highlights for 2023/2024:

- 16 peer-reviewed scientific papers (entire 180 °N)
- Six PhD dissertations and five master's theses completed (entire 180 °N)
- 60 oral- and poster presentations at international conferences (entire 180 °N)
- Secured new research funding for clinical translation of novel GFR tracer (NFR)

Neurostimulation and Brain Imaging Research Group (NBiG) and MMIV

Research Group Leaders:

NBiG: Leif Oltedal (PI), Olga Therese Ousedal (co-PI) and Ute Kessler (co-PI).
MMIV leader: Leif Oltedal

Number of Group Members: NBiG: 14, MMIV: 34

Research Focus in short:

- Neurostimulation, ECT and TMS
- Neuroradiological imaging, including brain tumours such as glioma and vestibular schwannoma

Research Focus:

For this report I only focus on the cancer and tumour related research, where we have several projects. We use advanced MRI including cutting-edge MR Spectroscopy to non-invasively measure the metabolite 2HG which can predict IDH – mutation status in gliomas. We also collaborate in experimental studies of new drugs used for glioblastoma treatment and develop algorithms for tumour detection and segmentation of vestibular schwannomas. Finally, we take part in the working group of the national research registry for brain and spinal cord tumours.

By developing machine learning tools for automated tumour segmentation, we aim to provide improved diagnostic workflows for and more precise tumour measurements.

Current Projects:

- Manual segmentation and algorithm development for vestibular schwannoma
- 2HG-MRS to evaluate IDH status in glioma patients
- Registry studies on brain and spinal cord tumours in Norway
- AI supported services for image diagnostics in Western Norway (ASIS)

Highlights for 2023/2024:

- 4 peer-reviewed papers focused on tumor/cancer.
- Initiated the Schwannoma quality control project
- Secured research funding (through ASIS) for a 5-year strategic project with 1 PhD in tumour imaging, 1 postdoc for AI-algorithm development and 1 programmer for algorithm and infrastructure development.

Department of Thoracic Medicine

Bergen Respiratory Research Group

Research Group Leader:

Professor Tomas M. L. Eagan (whole research group, for lung cancer associate Professor Marianne Aanerud)

Number of Group Members:

30, of which 15 researchers and technicians work directly with studies on lung cancer. Margrethe Aase Schaufel, the Group Leader for the Research Group for Palliative Care, is also affiliated with projects listed in the first part of the presentation.

Research Focus:

Etiology, biomarkers, and treatment effects in lung cancer

Research Focus:

As the department is in contact with approximately 10% of the lung cancer patients in Norway, either through diagnostic work up, treatment, or follow up, our department has great potential for data collection, both pre-treatment, during treatment, and through taking part in clinical studies. We collect data and collaborate with researchers at the institute of biomedicine (Agnete Engelsen and prof Thomas Arnesen), preclinical researchers (pharmacology, prof Silje Skrede), and clinical researchers in multi centre studies. As we now have funding for a post-doc in 50 %, we will contribute more actively also in the analyses and publication of data.

Current Projects:

1. Ongoing multi-centre trials on SCLC include ACHILES, TRIPLEX, IMPRESS. Ongoing multi-centre trials on NSCLC include DART, SOLUCOM and SUNRAY-01.
2. Ongoing data sampling: Respiratory and gut microbiome in patients with suspected lung cancer and examining differences in treatment effects. Sampling of blood from patients treated with immune checkpoint inhibitors for concentration measurements.
3. Prognostic factors for survival in limited stage SCLC. As 60% of patients with limited stage SCLC relapse and die from their disease despite treatment with curative intent, a project combining clinical and radiological data from the ACHILES and THORA studies on limited stage SCLC to find prognostic factors that can be used for treatment decisions.
4. Biobanking SCLC and implantation of lung cancer tissue in immune deficient MICE starting shortly.

Highlights for 2023/2024

- Secured new funding for one postdoc
- 6 peer-reviewed scientific papers in lung cancer

PhD Hanne Øye 24.05.2025 “Small cell lung cancer – The role of a putative tumour suppressor”, main supervisor Henriette Aksnes from Institute for Biomedicine, co-supervisor Marianne Aanerud

Head and Neck Clinic

Bergen Head and Neck Cancer Research Group

Research Group Leader: Professor Hans Jørgen Aarstad

Number of Group Members: About 10 associated investigators

Research Focus in short:

- Head and neck squamous cell carcinoma (HNSCC)
- Molecular biology, tumour immunology, surgical treatments, fear of recurrence, quality of life, patient satisfaction

Research Focus:

We have analysed somatic TP53 mutations and the TP53 single-nucleotide polymorphism (SNP) codon 72 (P72R; rs1042522) (proline → arginine) from patients with HNSCC. In HPV (-) patients we determined 80% prevalence of somatic TP53 mutations with TP53 R72 SNP cohort versus 40% in the TP53 P72 cohort ($p=.001$). 39/44 HPV (+) tumour patients harboured the TP53 R72, in contrast to 42/60 patients in the HPV (-) group ($p=.024$) Thus, being genetic Northern may raise risk of HNSCC. Patient satisfaction, fear of recurrence and quality of life scores are quality and prognostic indexes of health care. Personality can modulate such scores. Therefore, is important to identify the patients with “true” low scores. Appropriate interventions may then be planned.

Current Projects:

- We study the presence of somatic tumour mutations, single nuclear polymorphism (SNP) and HPV DNA incorporation in head and neck cancer and their influence on risk and prognosis.
- We study blood concentrations of inflammatory interleukins and growth factors, tumour infiltration levels of T lymphocyte/macrophage dependent on prognosis.
- We study the impact of HPV infection on prognosis and relation to standard clinical parameters. Of interest is also long-term prognosis dependency on inflammatory and HPV status.
- We study patient-reported QoL and treatment satisfaction regarding HNC patients following treatment. Of particular interest is how patient personality modulate these parameters.

Highlights for 2023/2024:

- We have shown that the presence of TP53 single-nucleotide polymorphism (SNP) codon 72 (P72R; rs1042522) (proline → arginine) likely influences the risk for HNSCC. As this SNP has a Northern gradient in prevalence, this likely increase the risk of contracting this disease in Norway compared to more a Southern Europe population.
- Further proof is gathered to state that activation of the IL-6 family inflammatory system at diagnosis in HNSCC patients signals poorer survival.
- Former HNSCC patients are mostly very satisfied with the health care they have received.
- To which extent HNSCC are not satisfied with the treatment they have received may be viewed secondary to their personality.

Laboratory Medicine and Pathology

Brain Tumour & Microenvironment Research Group

Research Group Leader: Hrvoje Miletic

Number of Group Members: 8

Research Focus in short:

- Glioblastoma (primary brain cancer)
- Basic and Translational

Research Focus:

Glioblastoma are highly malignant and invasive primary brain tumours that maintain close communication with their microenvironment. In our research group, we investigate the mechanisms through which tumour cells interact with each other and their surrounding microenvironment. Our findings have demonstrated that mitochondria can be transferred from normal astrocytes to tumour cells, promoting tumour growth and enhancing oxidative metabolism. Mitochondria transfer occurs through cytoplasmic extensions known as microtubes (MTs), which form connections between tumour cells and also link normal astrocytes to tumour cells, creating an extensive communication network. Our current research focuses on unravelling the molecular mechanisms underlying this network and its role in driving treatment resistance.

Current Projects:

- Molecular mechanisms of Microtubule formation in glioblastoma
- Molecular mechanisms of Mitochondria transfer in glioblastoma
- Impact of cell death on the immune microenvironment in glioblastoma

Highlights for 2023/2024:

- Publication in Nature Cancer: **GAP43-dependent mitochondria transfer from astrocytes enhances glioblastoma tumorigenicity.** *Nat Cancer. 2023 May;4(5):648-664.*
- Grant from Norwegian Cancer Society to study mechanisms of microtubule formation in glioblastoma

Breast Cancer of the Young – Bergen (BCY-B)

Research Group Leader: Elisabeth Wik og Erling A. Høivik

Number of Group Members: 9

Research Focus in short:

Young breast cancer, early-onset cancer, biomarkers, metastasis, molecular subtypes, tumour microenvironment, transcriptomics, immunohistochemistry, prognostic markers, therapy resistance

Research Focus:

BCY-B was established in 2020, and investigates the biological and clinical features of breast cancer in young women, using molecular profiling, transcriptomics, and advanced immunohistochemistry. The group focuses on biomarkers, tumour evolution, metastasis, and the tumour microenvironment to identify age-specific signatures and prognostic markers. The group's work enhances biological insights, refines risk stratification, informs development of personalized therapies, and contributes to the adaptation of clinical trial designs and treatment guidelines for younger patients.

Current Projects:

- **Molecular profiling of young breast cancer:** Identifying age-specific gene expression signatures and prognostic markers.
- **Discordant biomarker expression in metastases:** Studying matched primary tumours and metastases by biomarkers and multiomics data to uncover mechanisms of tumour progression.
- **Immune landscape analysis:** Investigating immune evasion patterns in tumours from young patients using multiplex immunohistochemistry.
- **Resistance mechanisms in therapy:** Exploring molecular drivers of treatment resistance in young breast cancer.

Highlights for 2023/2024:

- **Launch of BCY-B Biobank:** Successfully established a dedicated tissue and data repository for young breast cancer research.
- **High-impact publications:** Multiple publications related to molecular data, biomarker discovery and validation, and prognostication. Findings on biomarker discordance and survival outcomes published in a leading oncology journal.
 - Age-related clusters and favorable immune phenotypes in young breast cancer patients. Ingebriksen IM et al. *Mod Pathol.* 2024 Aug;37(8):100529. doi: 10.1016/j.modpat.2024.100529. [IF 7.39]
 - Age-related phenotypes in breast cancer: A population-based study. Svanøe AA et al. *Int J Cancer.* 2024 Jun 1;154(11):2014-2024. doi: 10.1002/ijc.34863. [IF 7.1]
 - Elevated expression of Aurora-A/AURKA in breast cancer associated with younger age and aggressive features. Ingebriksen IM et al. *Breast Cancer Res.* 2024 Aug 28;26(1):126. doi: 10.1186/s13058-024-01882-x.
- **International collaborations:** Early-phase partnerships with research groups in Europe and North America focusing on the young breast cancer topic.
- **Early-career researcher success:** Two Student Research program students have been awarded research stay at Vascular Biology Program, Boston Children's program, Harvard Medical School. One of the BCY-B group leaders has recently been appointed as professor at Department of Clinical Medicine (K1), section for pathology, at the University of Bergen. The BCY-B group leaders have held/is holding the leadership position at CCBIO Research School for Cancer Studies.

Cancer cell plasticity and therapy resistance group

Research Group Leader: Agnete S. T. Engelsen

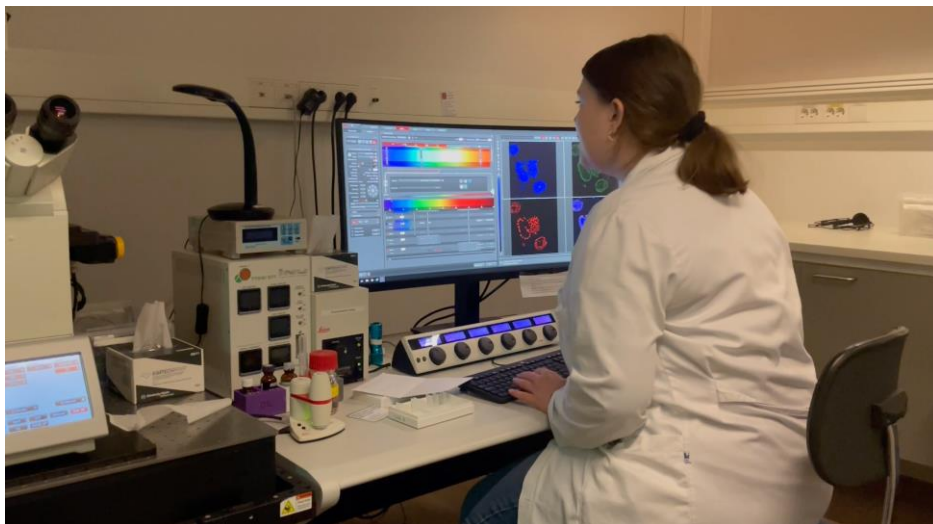
Number of Group Members: 2

Research Focus in short:

- NSCLC
- Basic/ translational

Research Focus:

Extracellular stressors, including exposure to anti-cancer therapies, low oxygen availability, immune editing, contribute to promoting phenotypic epithelial-to-mesenchymal plasticity, a recently recognized cancer hallmark and a mechanism that drives cancer therapy failure. The research group is dedicated to exploring how phenotypic plasticity interferes with therapeutic efficacy and immune cell-mediated killing. We apply preclinical in vivo and patient-derived in vitro models and cancer-cell immune cell co-culture models. We also use the imaging mass cytometry technology to explore how tumour-immune cell dynamics impact outcome in cohorts of non-small cell lung cancer patients treated with immune checkpoint inhibitor monotherapy at HUS.



PhD student Camilla T. Ekanger studying protein expression of patient-derived 3D organoid models using confocal microscopy.

Current Projects:

- The group has been dedicated to establishing improved preclinical models of non-small cell lung cancer (NSCLC) to explore how phenotypic plasticity interferes with therapeutic efficacy and immune cell-mediated killing. In collaboration with thoracic oncologists Marianne Aanerud and Fabian Gärtner, cardiothoracic surgeon Pirjo-Riitta Salminen, and pathologists Maria Ramnefjell and Professor Lars A. Akslen, the research group has established and characterized advanced patient-derived 3D models of NSCLC.
- The current projects aim to unravel the best molecular targets to prevent phenotypic plasticity-driven therapy resistance and immune escape in solid tumours. In collaboration with Professor James B. Lorens, the group aim to elucidate the effect of phenotypic plasticity on the spatial organization of tumour immune microenvironment to uncover predictive mechanisms of resistance in ICI-treated NSCLC patients. In particular, PhD students Maria Lie

Lotsberg and Austin Rayford has implemented the Imaging Mass Cytometry (IMC) platform to explore tumour immune dynamics in solid tumours affected by phenotypic plasticity

- In one subproject, we explore a therapeutic intervention with hyperbaric oxygen therapy (HBOT) to improve the efficacy of immune checkpoint inhibition by modulating the metabolism of and crosstalk between malignant cells and cells of the tumour immune microenvironment. The goal of this project is to address the remaining clinical challenge, that most NSCLC patients do not experience long-term benefit from ICI therapy.

Highlights for 2023/2024:

- **Key achievement/ publication:** Rayford A, Gärtner F, Ramnefjell MP, Lorens JB, Micklem DR, Aanerud M, Engelsen AST. AXL expression reflects tumour-immune cell dynamics impacting outcome in non-small cell lung cancer patients treated with immune checkpoint inhibitor monotherapy. *Frontiers in Immunology*, Aug 2024.
- **Project milestone:** An organoid model for translational cancer research recapitulates histoarchitecture and molecular hallmarks of non-small cell lung cancer (manuscript in preparation)
- **PhD defence:** Austin Rayford. Main supervisor: James B. Lorens, co-supervisor: Agnete S. T. Engelsen and David Micklem. Title of thesis: Studies on the effect of AXL inhibition in non-small cell lung cancer.
- **Event:** 2nd CCBIO-VBP Research Meeting. August 28-31 2024. The 2nd Research meeting in the INTPART collaboration between CCBIO and the Vascular Biology Program (VBP), Boston Children's Hospital and Harvard Medical School (HMS). Coordinators: Agnete S. T. Engelsen and Michael Rogers (VBP/ HMS). Oral presentations and poster session.

Computational Pathology Bergen (COMPAT Bergen)

Research Group Leader Team: Sabine Leh (Pathology) and Hrafn Weishaupt (Computer Science)

Number of Group Members: 9

Research Focus in short:

- Digital pathology, computer aided diagnostics, methods in AI (unsupervised learning, weakly supervised learning, multiple instance learning, explainable AI)
- Implementation research, user-centred adoption, benefit analysis
- Workflow optimization

Research Focus:

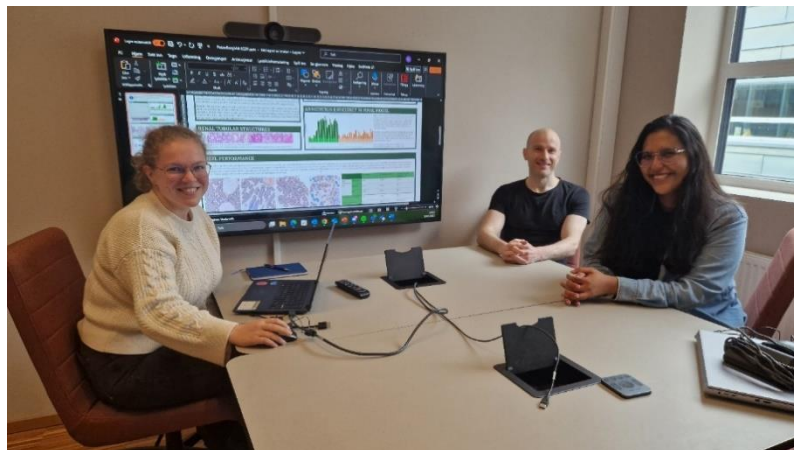
We are an interdisciplinary research group based in Bergen, advancing methodological AI research for applied digital pathology. Emerging from a regional strategic initiative, our goal is to enhance diagnostic precision in both cancer and non-neoplastic diseases. Our activities span the entire research and development continuum—from hypothesis generation and study design, through experimental investigation and analysis, to product development, regulatory alignment, and clinical integration with a focus on user experience and benefit analysis. We cover original research, industry collaboration, and AI support for other research teams, drawing on expertise in pathology, computer science, mathematics, medical technology, and biomedicine.

Current Projects (cancer-related):

- Development of an AI tool for classification of colorectal polyps
- Implementation of artificial intelligence as support tools for pathology in Helse Vest
- From Pixels to Practice: Building a Framework for Validation and Impact Assessment of AI tools in Pathology

Highlights:

- Live view goes live: Our own laboratory dashboard with real-time numbers and daily goals
- Starting implementation research with 2 AI tools for prostate cancer and breast cancer
- Actively contributing to the European Society of Digital and Integrative Pathology, including scientific input and organizational support for the annual congresses in 2023 and 2024.



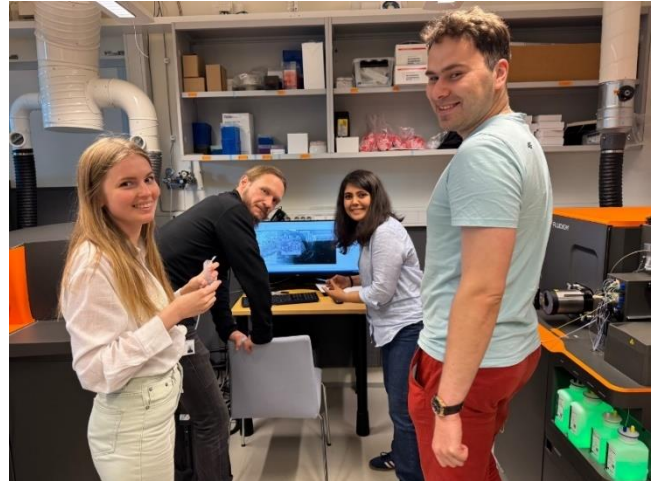
Early Breast Cancer

Research Group Leader: Carina Strell

Number of Group Members: 4

Research Focus in short:

- [Breast cancer, Non-small cell lung cancer, Cancer progression, Therapy resistance, Immunotherapy]
- [Basic/Translational, Predictive biomarker, Diagnostic assay development]



Research Focus:

[Our group focuses on functional diagnostics, where we shift from static biomarkers to maps of active signalling pathways in diagnostic tissues providing direct treatment rationales. By integrating pathway-specific proximity-ligation assays (PLA) with spatial multi-omics (RNA, protein, metabolites), we generate actionable biomarkers of cancer progression, resistance and treatment-associated toxicity. We recently showed that active PD1/PDL1 signalling outperforms the current clinical standard of PDL1 IHC in predicting immunotherapy benefit in NSCLC (Lindberg et al., JTO 2024). We also quantify HER2 activation in breast cancer to optimize neoadjuvant trastuzumab/pertuzumab. Finally, we dissect cell fate pathways discriminating indolent from aggressive ductal carcinoma in situ.

Current Projects:

- [Functional diagnostics: PD1-PDL1 interaction as predictive biomarker for immunotherapy in NSCLC]
- [Functional diagnostics: Assessing HER2 activation status to better guide neoadjuvant trastuzumab/pertuzumab therapy of HER2+ breast cancer]
- [Cell fate determinants in ductal carcinoma in situ: indolence versus invasive progression]
- [Cancer treatment associated cardiotoxicity]

Highlights for 2023/2024:

- [Accepted publication in JTO (Lindberg et al, JTO, 2024/2025, impact factor 20.1) showing that in situ detection of PD1/PDL1 interactions functions as a functional predictor for response to immune checkpoint inhibition in NSCLC]
- [2024 Kreftföreningen Project Grant to our group for our work on functional diagnostics to improve immunotherapy strategies]

Experimental Pathology Research Group

Research Group Leader: Daniela Elena Costea

Number of Group Members: 16

Research Focus in short:

Head and neck cancer, vulva cancer, cancer associated fibroblasts, 3D models, tumour-stroma interactions

Research Focus:

We investigate the contribution of non-inflammatory tumour stroma, particularly cancer-associated fibroblasts (CAFs), to tumour progression in head and neck and vulvar cancer. Our work emphasizes CAF heterogeneity, aiming to identify tumour-constraining subsets with potential for therapeutic exploitation. By characterizing CAF-driven mechanisms, we seek novel biomarkers for patient stratification and more effective targeted treatments. In parallel, we develop advanced *ex vivo* models that better recapitulate the tumour microenvironment, enabling prediction of therapy response and preclinical testing of new strategies. A key goal is to translate these insights into affordable diagnostic and prognostic tools applicable in both high- and low-resource healthcare settings, through national and international collaborations.

Current Projects:

- Predictive biomarkers for immunotherapy in head and neck squamous cell carcinoma
- Development of *ex vivo* multicellular models as functional precision medicine tools for head and neck squamous cell carcinoma.
- Exploring CAF heterogeneity in normal and neoplastic mucosa using imaging mass cytometry (Hyperion) and spectral flow cytometry.
- Establishing a human-derived extracellular matrix from autopsy material as a replacement for Matrigel/collagen in experimental cancer models.

Highlights for 2023/2024:

- **Developing methodology for spatial immune–stroma profiling:**
Development of a high dimensional imaging mass cytometry panel to investigate spatial organization of tissue microenvironment in formalin-fixed archival clinical tissues.
Tornaas S, Kleftogiannis D, Fromreide S, Smeland HY, Aarstad HJ, Vintermyr OK, Akslén LA, Costea DE, Dongre HN. *Heliyon*. 2024 May 14;10(10):e31191. doi: 10.1016/j.heliyon.2024.e31191. PMID: 38803925; PMCID: PMC11128903.
We achieved the establishment of a robust imaging mass cytometry panel, enabling spatial mapping of immune and stromal cells in archival head and neck cancer tissues and creating new opportunities for biomarker discovery.
- **Advancing biomarker-driven patient stratification in vulvar cancer:**
Prognostic Value of an Integrated Human Papillomavirus and Immunoscore Model to Predict Survival in Vulva Squamous Cell Carcinoma.
Elnour R, Hindenes IH, Færevaaag M, Kolseth IBM, Thomsen LCV, Johannessen AC, Costea DE, Bjørge L, Dongre HN. *Mod Pathol*. 2025 Jun 10;38(10):100809. doi: 10.1016/j.modpat.2025.100809. PMID: 40505815.
This study advanced the development of a prognostic model integrating HPV status and immunoscore, providing a more powerful tool for predicting survival and stratifying patients with vulvar SCC.
- **Achieving interdisciplinary innovation with functional nanomaterials:**
Zwitterionic Dipeptide Surface Functionalization of Detonation Nanodiamond for Enhanced Control in Biological Environments.

Mayerhoefer E, Parajuli H, Cimpan MR, Costea DE, Dongre HN, Krueger A. *Angew Chem Int Ed Engl.* 2025 Jun 17;64(25):e202501202. doi: 10.1002/anie.202501202. Epub 2025 May 19. PMID: 40159347; PMCID: PMC12171329.

Through international collaboration, we achieved novel surface functionalization strategies for nanodiamonds, with broad potential in biomedical applications and oncology, highlighting interdisciplinary research impact.

- **Providing new insights into CAF heterogeneity in head and neck cancer:**

Heterogeneity of cancer-associated fibroblasts and tumor-promoting roles in head and neck squamous cell carcinoma.

El Herch I, Tornaas S, Dongre HN, Costea DE. *Front Mol Biosci.* 2024 Jun 20;11:1340024. doi: 10.3389/fmolb.2024.1340024. PMID: 38966131; PMCID: PMC11222324.

This review synthesized recent advances on CAF diversity, achieving a conceptual framework for distinguishing tumour-promoting versus constraining subtypes and outlining their therapeutic potential.



PhD candidate Lorena Larios Salazar showing to surgeon Karpal Singh how we make 3D organoids in our cell culture lab, Experimental Pathology Research Group, Department of Pathology

Hormone laboratory breast cancer research group

Research Group Leader: Gunnar Mellgren

Number of Group Members:

Kristin Viste, Thomas Helland, Bjørn-Erik, Pouda, Gunnar, Regine, Jan Inge and others.

Research Focus in short:

- [Breast Cancer, tamoxifen, endocrine treatment, aromatase inhibitors, IRX3]
- [Basic/Translational/Clinical]

Research Focus:

The main research focus is endocrine treatment of hormone-sensitive breast cancer, with emphasis on tamoxifen and aromatase inhibitor (AI) efficacy, side effects, and treatment adherence. Utilizing advanced LC-MS/MS assays, the group has developed the world's most sensitive estrogen assay, concurrently quantifying all third-generation AIs. Tamoxifen and clinically relevant metabolites are measured with world leading sensitivity and selectivity. Annual liquid biopsies from >1000 patients via the PBCB biobank support real-world data studies. The group also conducts basic research, notably on IRX-3, and has long been at the forefront of hormone-sensitive breast cancer research, producing high-impact publications and collaborations.

[Concise and academically precise description of the research group's focus, highlighting key areas of investigation, methodologies, and impact]

Current Projects:

- Adherence to endocrine treatment - study of adherence to endocrine treatment (AIs and tamoxifen) of >500 patients from PBCB with drug concentration and prescription data available.
- Prospective Breast Cancer Biobank (PBCB) – A biobank collecting yearly liquid biopsies from more than 1000 breast cancer patients with 11 years follow-up.
- Tamoxifen metabolism and clinical efficacy – a study of the possible relationship between active tamoxifen metabolite serum concentrations and clinical outcome in breast cancer patients
- AI estrogen suppression – sub picomolar estrogen levels and AI drug concentrations in breast cancer patients are utilized to determine inter-patient differences in estrogen suppression during AI treatment
- Androgen effects
- IRX3

Highlights for 2023/2024:

- PMID: 38494911
- PMID: 37403065
- PMID: 34958096

InPreD Cancer Genomics

Research Group Leader: Randi Hovland

Number of group members: 6

Research focus in short:

- Molecular markers in cancer: Diagnosis, prognosis and predictive markers

Research Focus:

Cancer Genomics research focus is molecular biomarkers in diagnosis and treatment of cancer. Assessment of the clinical utility for biomarkers and validation to ensure effective integration and appropriate use of molecular markers in diagnostic and clinical practice is one of our main objectives. Our research projects collaborate closely with the clinical departments and aim to pave the way for the implementation of cutting-edge molecular diagnostic modalities in order to facilitate precision medicine in public cancer care.

Our research employs a range of molecular methods to detect genetic markers from FISH to next generation sequencing and methylation profiling in solid tumours, haematological malignancies and circulating molecular markers.

Current Projects:

- IMPRESS Norway: Improving Public cancer care by Implementing Precision medicine in Norway
- NorCUP: Better diagnosis of Cancer of Unknown Origin (CUP)
- Process improvement of acute leukaemia diagnosis using whole genome sequencing (WGS)
- Methylation profiling in classification of CNS using the Oxford Nanopore technology
- Assessment of the clinical utility of ctDNA in right-sided colon cancer

Highlights for 2023/2024:

- The NorCUP project received funding from the Norwegian Cancer Society
- Start of Process improvement of acute leukaemia WGS project
- Paper “Assessment of postoperative circulating tumour DNA to predict early recurrence in patients with stage I-III right-sided colon cancer: prospective observational study. DOI: [10.1093/bjsopen/zrad146](https://doi.org/10.1093/bjsopen/zrad146)
- Paper “IMPRESS-Norway: improving public cancer care by implementing precision medicine in Norway; inclusion rates and preliminary results”. DOI: [10.2340/1651-226X.2024.28322](https://doi.org/10.2340/1651-226X.2024.28322)

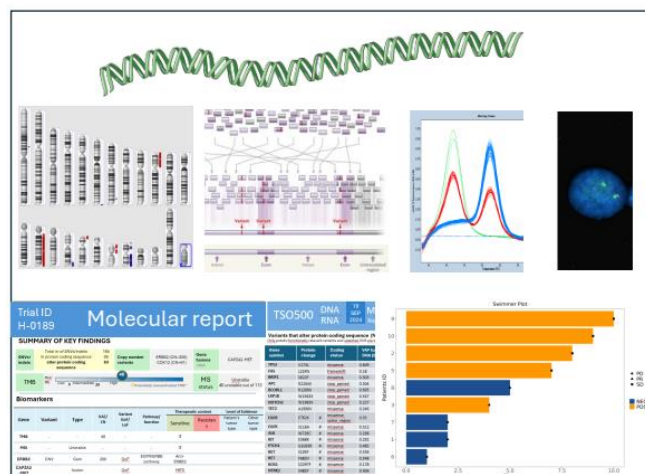


Illustration: From molecular methods to clinical decisions

Molecular Pathology of Pancreatic Disease

Research Group Leader: Professor Anders Molven

Number of Group Members: 6

Research Focus in short:

- Pancreatic cancer
- Basic/Translational

Research Focus:

We are studying the implications of genetic alterations, either occurring in the germline or as somatic mutations, for pancreatic cancer risk and development. This involves investigations of the blood group gene ABO, the gene encoding the digestive enzyme carboxyl ester lipase (CEL) and oncogenic variants of the signalling protein KRAS. Our research takes advantage of: (1) A biobank of tumour, blood and pancreatic juice samples from patients with pancreatic neoplastic disease evaluated and treated at Haukeland University Hospital; (2) Genetic mouse models for chronic pancreatitis recently developed by our group. (3) Spatial characterization of pancreatic neoplastic lesions by imaging mass cytometry.

Current Projects:

- Development of a mouse model of chronic pancreatitis into a model for pancreatic cancer
- Analysis of mutational signatures in blood and pancreatic juice from patients with pancreatic cancer
- Studies of CEL germline variants as genetic risk factors for pancreatic cancer

Highlights for 2023/2024:

- Successful establishment and publication of two new mouse models for chronic pancreatitis (CEL-HYB, CEL-MODY)
- Publication of prevalence data and functional analyses of *CEL* insertion variants

Tumor Biology Research Group

Research Group Leader: Lars Akslen

Research Focus in short: Angiogenesis, tumour vascular interactions, studies of tumour spread via lymphatic or blood vessels, DNA gene expression analyses, various biomarkers in breast cancer, and a project on breast cancer in men.

Biological and clinical-pathological markers in breast cancer in men – a retrospective study. While breast cancer is the most common cancer among women in both Norway and the Western world, breast cancer in men is a rare form of cancer, accounting for < 1% of all breast cancers. However, the cancer has shown increasing incidence in recent decades. The disease mainly occurs in men over 65 years of age, and at the time of diagnosis the tumour is often larger and with more frequent findings of lymph node metastases. Knowledge of etiology and risk factors is lacking, this may be due to the low incidence of the cancer, where knowledge is based on small retrospective studies. Several risk factors are nevertheless known; most are related to hormonal factors. Genetic causes also appear to play a role, and there is familial accumulation and increased incidence in BRCA2 mutations. Molecular studies indicate that breast cancer in men has a different biology with unique biological changes. However, much is unknown, and there is a need for more studies. The study population will include all men diagnosed with breast cancer in the period 1996-2020 in Hordaland and at Haukeland University Hospital. Tumour material from the patients will be included from the diagnostic biobank at the Department of Pathology, Haukeland University Hospital. The cohort will be followed up regarding clinical recurrence, metastases, cancer-specific death and other causes of death. The goal of the project is to map biological, pathological-anatomical and clinical markers in breast cancer for increased knowledge, improved diagnostics and to define potentially new treatment targets. One wants to map known biomarkers (ER, PGR, HER2) as well as markers related to proliferation. Furthermore, it will be interesting to map the tumour microenvironment with a particular focus on angiogenesis and immunological factors.

Current Projects:

- Breast cancer
- Breast cancer in men
- Gynaecological cancer

Highlights for 2023/2024:

Age-Related Clusters and Favorable Immune Phenotypes in Young Breast Cancer Patients.

Ingebriksen LM, Svanøe AA, Myrmel Sæle AK, Humlevik ROC, Toska K, Kalvenes MB, Aas T, Heie A, Askeland C, Knutsvik G, Stefansson IM, Akslen LA, Hoivik EA, Wik E.

Mod Pathol. 2024 Aug;37(8):100529. doi: 10.1016/j.modpat.2024.100529. Epub 2024 May 27.

PMID: 38810731

Elevated expression of Aurora-A/AURKA in breast cancer associates with younger age and aggressive features.

Ingebriksen LM, Humlevik ROC, Svanøe AA, Sæle AKM, Winge I, Toska K, Kalvenes MB, Davidsen B, Heie A, Knutsvik G, Askeland C, Stefansson IM, Hoivik EA, Akslen LA, Wik E.

Breast Cancer Res. 2024 Aug 28;26(1):126. doi: 10.1186/s13058-024-01882-x.

PMID: 39198859

Age-related phenotypes in breast cancer: A population-based study.

Svanøe AA, Humlevik ROC, Knutsvik G, Sæle AKM, Askeland C, Ingebriksen LM, Hugaas U, Kvamme AB, Tegnander AF, Krüger K, Davidsen B, Hoivik EA, Aas T, Stefansson IM, Akslen LA, Wik E. *Int J Cancer*. 2024 Jun 1;154(11):2014-2024. doi: 10.1002/ijc.34863. Epub 2024 Feb 6. PMID: 38319154

[Breast cancer in men – histopathology and biomarkers].

Lokøy IK, Bakken IS, Wik E, Stefansson IM.

Tidsskr Nor Laegeforen. 2024 Mar 27;144(5). doi: 10.4045/tidsskr.23.0438. Print 2024 Apr 23.

PMID: 38651722

Molecular and phenotypic characteristics influencing the degree of cytoreduction in high-grade serous ovarian carcinomas.

Torkildsen CF, Thomsen LCV, Sande RK, Krakstad C, Stefansson I, Lamark EK, Knappskog S, Bjørge L.

Cancer Med. 2023 Jul;12(13):14183-14195. doi: 10.1002/cam4.6085. Epub 2023 May 16.

PMID: 37191035

Endometrial Pipelle Biopsy Computer-Aided Diagnosis: A Feasibility Study.

Vermorgen S, Gelton T, Bult P, Kusters-Vandeveldt HVN, Hausnerová J, Van de Vijver K, Davidson B, Stefansson IM, Kooreman LFS, Qerimi A, Huvila J, Gilks B, Shahi M, Zomer S, Bartosch C, Pijnenborg JMA, Bulten J, Ciompi F, Simons M.

Mod Pathol. 2024 Feb;37(2):100417. doi: 10.1016/j.modpat.2023.100417. Epub 2023 Dec 27.

PMID: 38154654

New immune phenotypes for treatment response in high-grade serous ovarian carcinoma patients.

Torkildsen CF, Austdal M, Jarmund AH, Kleinmanns K, Lamark EK, Nilsen EB, Stefansson I, Sande RK, Iversen AC, Thomsen LCV, Bjørge L.

Front Immunol. 2024 Jun 14;15:1394497. doi: 10.3389/fimmu.2024.1394497. eCollection 2024.

PMID: 38947323

Western Norway Familial Cancer center (Regionalt kompetansesenter for arvelig kreft)

Center leader: Cathrine Bjorvatn

Number of Group Members: 6

Research Focus in short:

Hereditary cancer syndromes, rare cancer syndromes, cost-effectiveness analysis, clinical practice improvement, patient-centred information tools, functional diagnostic testing, digital health innovation

Research Focus:

Our research is closely integrated with clinical practice, enabling the rapid implementation of beneficial findings into everyday patient care. This includes both functional laboratory testing and evaluating how patients experience receiving information across different platforms. Our goal is to ensure that patients receive safe, efficient, and personalized care, tailored to their individual informational needs.

We also conduct cost-benefit analyses to support evidence-based decision-making and resource allocation. The PREVENTABLE project was created to assess the clinical, social and financial impact of applying multidisciplinary and specialized care to prevent advanced disease in families suffering from Rare tumour risk syndromes.

Current Projects:

- Developed, evaluated, and implemented a chatbot based on AI to support patients during genetic testing for hereditary breast and ovarian cancer. We aim to further develop the chatbot to include other common hereditary cancer syndromes, such as Lynch syndrome and hereditary melanoma.
- We are leading the Norwegian arm of EU Horizon project: PREVENTABLE.
- INSPECT: *European study on PTEN-related cancer and phenotypic variation.*
- Familial Cancer Clustering and Future Cancer Risk Among Relatives. *Investigation of familial cancer aggregation and the risk of future cancer development in family members*

Highlights for 2023/2024:

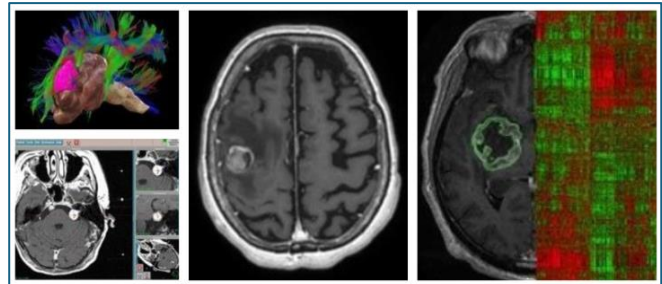
- **Henrikke Nilsen Hovland** defended her Ph.D. degree at the University of Bergen on March 21, 2023, with the dissertation titled '*Functional analyses of BRCA1 variants of unknown significance found in hereditary breast or ovarian cancer families in Norway: A tool for improved diagnosis.*' Main supervisor **Elisabet Ognedal**.
- Evaluation of the Rosa Chatbot Providing Genetic Information to Patients at Risk of Hereditary Breast and Ovarian Cancer: Qualitative Interview Study. **Siglen E**, Vetti HH, Augestad M, Steen VM, Lunde Å, **Bjorvatn C.** J Med Internet Res. 2023 Sep 1;25:e46571. doi: 10.2196/46571.PMID: 37656502 Free PMC article.
- Correction to: Thirty-years of genetic counselling education in Europe: a growing professional area. Paneque M, O Shea R, Narravula A, **Siglen E**, Ciuca A, Abulí A, Serra-Juhé C Eur J Hum Genet. 2024 Nov;32(11):1515PMID: 38462655
- **Elisabet Ognedal** PMID: 37800450 and PMID: 39357517

Neuro Clinic – Dept of Neurosurgery

Neurosurgical research

Academic Qualifications in the research group

2 professors, 2 associate professors and 14 PhDs (4 PhD candidates, 9 consultants / specialists with MD/PhD and 1 specialist candidate with MD/PhD)



Research Focus in short:

- Benign and malignant brain tumours, Gamma Knife radiosurgery, paediatric neurosurgery, degenerative spinal disorders, neurotrauma and neurovascular disease and quality improvement in neurosurgery
- Basic/Translational/Clinical/ Epidemiological/Health Services Research

Research Focus:

The department has the National Treatment Centre for Vestibular Schwannomas and the National Treatment Centre for Gamma Knife Radiosurgery, of which research is key activity. We have over 40 years collaborated with the Translational Brain Tumour Research Group at the University of Bergen, particularly on high grade primary tumours and brain metastases. We have built a large biobank of brain tumours over the last 20 years, which is a key asset in multiple research projects. Several colleagues have been instrumental in the foundation of the Norwegian Brain Tumour Consortium, which has developed a Norwegian Brain Tumour Registry and is facilitating clinical trials across Norway. We currently lead or participate in five clinical intervention trials on brain tumours. We have strong national, Nordic and international collaborations in brain tumour research and co-lead the NorTrials Brain Centre for industrial partnerships in clinical trials.

Current Projects:

- Vestibular schwannomas: T-REX – Ten-year outcomes after radiosurgery or expectation of vestibular schwannoma (randomized controlled trial)
- Gamma Knife Radiosurgery: Salazopyrin (Sulfasalazine) in combination with stereotactic radiosurgery against recurrent glioblastoma (phase 1 trial)
- Brain Metastases Research Group: Genetics of brain metastases and associated primary tumours (basic/translational study)
- Norwegian Brain Tumour Consortium: Personalized functional profiling of glioblastoma (phase 1 drug screening study)

Highlights for 2023/2024:

- The department contributed to 100 PubMed-indexed publications
- Organized the 9th quadrennial conference on vestibular schwannomas and other CPA tumours in 2023 (500+ participants).
- Publication of “Upfront radiosurgery vs wait-and-scan for small-to medium-sized vestibular schwannoma: The V-REX randomized controlled trial” in JAMA 2023
- Leading role in the development of the Norwegian Brain Tumour Registry and writing its first two annual reports

Paraneoplastic neurological syndromes

Research Group Leader: Christian Vedeler

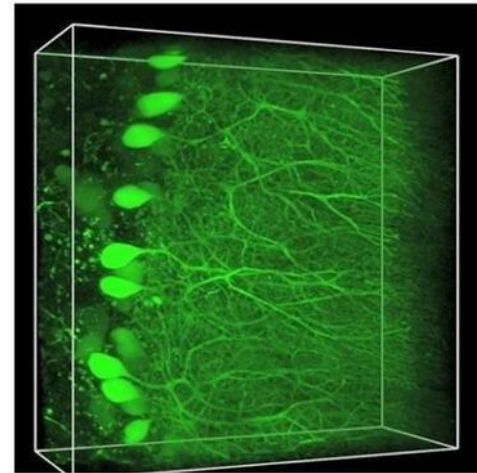
Number of Group Members: 7

Research Focus in short:

- Gynaecological cancer, Cerebellum
- Translational medicine

Research Focus:

Paraneoplastic neurological syndromes (PNS) are autoimmune and neurodegenerative diseases which occur as effects of cancer that affect the nervous system. PNS is characterized diagnostically by the presence of specific autoantibodies in serum and cerebrospinal fluid. Each autoantibody is associated with specific neurological syndromes and cancer types. The major hypothesis about the origins of PNS asserts that tumours express antigens that are normally expressed almost exclusively in nervous tissue. The presentation of neuronal antigens by tumour cells then mounts an immune response against the tumour which cross-reacts with the nervous tissue expressing similar proteins (2).



A 3D reconstruction of green fluorescent Purkinje neurons in a cerebellar section, captured with a multiphoton microscope. Our research primarily centers on Purkinje neurons due to their involvement in Paraneoplastic Cerebellar Degeneration (PCD).

The research group mainly works on one of the most common PNS, paraneoplastic cerebellar degeneration (PCD). PCD is an immune-mediated disorder that occurs in 0.5–1% of women with ovarian or breast cancer. The onconeural autoantibody Yo is found in both cerebrospinal fluid and serum of PCD patients and targets cerebellar degeneration-related proteins (CDR2 and CDR2L), which are expressed in both cancer cells and cerebellar Purkinje neurons. This autoimmune response results in cerebellar degeneration with loss of Purkinje neurons, which causes rapid progress and debilitating loss of motor control and coordination.

Current Projects:

- Improve characterization of onconeural antibodies used for PNS diagnosis
- Immune characterization of ovarian cancer and PCD cerebellum
- Exosome characterization of proteins connecting tumour and cerebellum

Highlights for 2023/2024:

- Altered exosomal miRNA profiles in patients with paraneoplastic cerebellar degeneration
- Multi-omics profiling reveals dysregulated ribosome biogenesis and impaired cell proliferation following knockout of CDR2L
 - Development and Optimization of a Multilayer Rat Purkinje Neuron Culture
 - Case Report: Limbic encephalitis following treatment with durvalumab for small-cell lung cancer

Surgical clinic

Bergen Urological Research Group

Research Group Leader: Christian Beisland

Number of Group Members: 20

Research Focus in short:

- Kidney, Urothelial (Bladder, Upper tract), Prostate, Testicular, Penile
- Basic/Translational/Clinical/ Epidemiological/Health Services Research

Research Focus:

The group conducts clinical, translational, and epidemiological research on urological cancers—renal, urothelial, prostate, testicular, and penile. Focus areas include diagnostics, treatment strategies, surgery, complications, follow-up, late-effects of treatment, quality of life, and psychosocial factors. The group also includes subgroups working on benign urology (e.g., endourology and urolithiasis), where significant overlap with cancer diagnostics and treatment provides strong translational value. The team co-leads and participates in RCTs and observational studies nationally and internationally, with strong Nordic collaboration and industrial partnerships ensuring access to innovative methods and technologies.



Current Projects:

- The penile cancer research focuses on HPV-related prognosis, surgical outcomes, and molecular/genetic mechanisms. Studies include long-term cohorts and registry data, complication analyses, and development of organoid models for translational research.
- The prostate cancer project focuses on introducing a safer transperineal biopsy method under local anaesthesia, significantly reducing complications while maintaining high cancer detection rates to improve patient safety and outcomes.
- The bladder cancer projects focus on investigator-initiated RCTs, including chemoablation for non-muscle invasive tumours (the Nordic COBRA trial) and a setting up a national multicentre trial on a novel lymph node dissection technique during cystectomy (the NOR-BLOC - trial).
- In kidney cancer, the focus is currently launching two new Nordic multicentre trials. The Nordic-SUN trial, which evaluates the effect of cytoreductive nephrectomy after

immunotherapy in patients with metastatic disease, and the RESTART trial, comparing surgery and ablation for small renal tumours

Highlights for 2023/2024:

- The group contributed to 116 PubMed-indexed publications, of which 32 were cancer related.
- Organized the 35 biennial Congress of the Scandinavian Association of Urology (500+ participants), and 7 group members were official speakers at the 2024 annual congress of the European association of Urology in Paris (11.000+ participants)
- Publication of the translational Phase I prospective, non-randomized trial of autologous dendritic cell-based cryoimmunotherapy in patients with metastatic castration-resistant prostate cancer.
- Leading role in establishing a national research consortium for bladder cancer.

Gastrointestinal surgery research group

Research Group Leader: Frank Pfeffer

Research Focus: The group conducts epidemiological, register based, clinical and translational research on gastrointestinal cancers—upper GI-cancer (oesophagus), hepato-pancreato-biliary cancer (primary liver cancer (HCC), cholangiocarcinoma, pancreatic cancer and colorectal liver metastasis) and colorectal cancer (colon cancer, rectal cancer and early colorectal cancer. Focus areas include diagnostics, risk stratification, treatment strategies, endoscopic treatment of early cancer, surgery, complications, follow-up and quality of life. The group also works on individual preoperative testing and prehabilitation in elderly patients (> 70 years) with oesophageal or colorectal cancer. For oesophageal and pancreatic cancers, the group participates in biomarker trials. The colorectal group leads a prospective biomarker trial with broad genetic mapping and analysis of circulating tumor DNA in patients with right-sided colon cancer. The team is currently working on an extension of this project to include all patients with colorectal cancer in Helse Bergen, Helse Førde and Helse Fonna. The team participates in RCTs and observational studies nationally and internationally.

Current Projects

Upper GI:

- NORECA (Norwegian Esophageal Cancer Consortium) - National multicentre prospective study with biobanking and registry of clinical parameters in patients with oesophageal cancer.

Hepato-pancreato-biliary:

- ASAC trial (closing) – Nordic multicentre RCT with aspirin adjuvant in patients undergoing resection for colorectal liver metastases.
- NORPACT-III trial (recruiting) – Norwegian multicentre prospective trial in patients with borderline and locally advanced pancreatic cancer. Registry of clinical parameters, sampling of circulating tumor DNA. Study of resection rates following neoadjuvant chemotherapy.
- “No Drain Trial” (recruiting) – Norwegian multicentre observational trial in patients undergoing distal pancreatic resection leaving no drain after resection.

Colorectal:

- Radical right colectomy (RRC) (Recruiting) - Prospective observational study
- SCAR (Surgery versus Endoscopic Resection for Incompletely Removed Early Colon Cancer) Trial (Recruiting) - European multicenter randomized controlled trial (RCT). Local primary investigator.
- Open D3 hemicolectomy compared to laparoscopic CME right hemicolectomy for right-sided colon cancer (Closed) - Multicenter RCT including a prospective biomarker study (ct DNA and single-cell immunoprofiling).
- Prospective observational study on robotic colorectal surgery (Recruiting) - Ongoing observational study focusing on robotic techniques in colorectal procedures.
- No Stoma Trial (Closed) - Norwegian multicenter observational study. Local primary investigator and part of the steering group.
- SELSA Trial (Recruiting) - SElective defunctioning Stoma Approach in low anterior resection for rectal cancer (SELSA): a prospective study with a nested randomised clinical trial. Nordic multicenter RCT. Local primary investigator and part of the steering group.
 - Assessment of difficulty level in robotic low anterior rectal resections (Recruiting)

Highlights from 2023/2024

- The group contributed with 39 PubMed- indexed publications
- Hosting the Nordic HPB meeting September 2024 with 250 participants.
- Hosting the Norwegian Robotic meeting Gastrointestinal surgery May 2023 with 70 participants
- Defence of thesis June 2024 (Kristin B. Lygre)

Women's Clinic

Bergen Research Group for Gynecological Cancer

Research Group Leader: Professor Camilla Krakstad

Number of Group Members: 15

Research Focus in short:

- Gynaecological cancer; main focus endometrial and cervical cancers
- Translational research

Research Focus:

This highly international research group focuses on better understanding of endometrial and cervical cancer development, molecular subtypes and cancer cell mechanisms aiming to improve patient treatment. A population-based biobank with associated clinical data allows biomarker studies and real-world data analysis, molecular profiling of cervical and endometrial cancers, including identification of single-cell phenotypes and clonal evolution. Endometrial cancer patient-derived organoid models have been established from all histological grades and subtypes. These models are used to investigate treatment resistance through genome-wide library CRISPR-Cas based screens, treatment response in orthotopic mouse models, and profiling of metastatic clones from *in vivo* implantation through genetic barcoding technology.

Current Projects:

- Identification and implementation of biomarkers for endometrial cancer
- Genetic and phenotypic profiling of uterine cancers
- Identification of resistance mechanisms in uterine cancers
- Genetic profiling of metastatic cell-clones

Highlights for 2023/2024:

1. Krakstad, C., Berg, H. F., Lindemann, K. & Halle, M. K. Frequency of ERBB2-Low Expression in Endometrial Cancer. *JAMA Oncol* 10.1001/jamaoncol.2024.3660 (2024).
2. Lien H. E. et al. Single-cell profiling of low-stage endometrial cancers identifies low epithelial vimentin expression as a marker of recurrent disease, *EBioMedicine* 92 (2023) 104595.
3. Berg H. F. et al. Mismatch repair markers in preoperative and operative endometrial cancer samples; expression concordance and prognostic value. *Br J Cancer*, doi:10.1038/s41416-022-02063-3 (2022).
4. Forsse, D. et al. Longitudinal effects of adjuvant chemotherapy and lymph node staging on patient-reported outcomes in endometrial cancer survivors: a prospective cohort study. *Am J Obstet Gynecol* 226, 90 e91-90 e20, doi:10.1016/j.ajog.2021.08.011 (2022).



GenderHealth at VID Specialized University.

Research Group Leader: Tone Dahl-Michelsen and Ragnhild Tveit Sekse

Number of Group Members: Approximately 30 participants with one-third focusing on cancer research, particularly rehabilitation and follow up.

Research Focus in short:

- Gynaecological cancer
- Digital rehabilitation

Research Focus:

The Gender Health research group at VID Specialized University explores the intersections of gender and health across diverse contexts. Our interdisciplinary approach draws from public health, ethics, and nursing science to understand how gender influences health outcomes, access to care, and experiences within healthcare systems.

In the field of cancer research, one PhD candidate has completed a dissertation on women's experiences with gynaecological cancer and their participation in the digital psycho-educational program *Gynea* (Breistig et al., 2024). *Gynea* was developed as part of the Intromat project, funded by the Research Council of Norway (2016-2020), and tested in a feasibility study with 70 participants nationwide. We have now applied for "Såkornmidler (2025-2027)" to implement the program in clinical practice.

Another PhD project has explored user experiences with the *Rosa chatbot* (Siglen et al., 2025). Additional, Sekse is involved in other research groups and has contributed to several studies (see reference list).

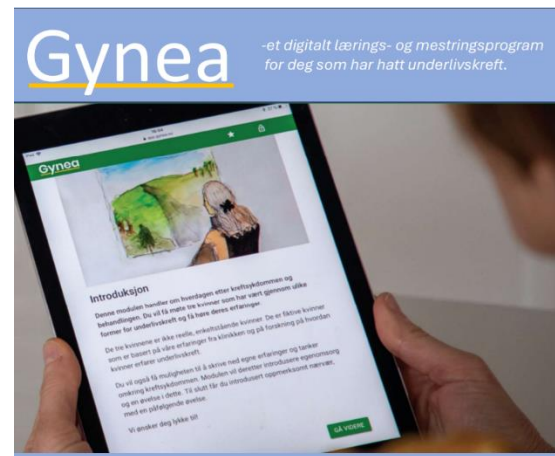
Current Projects:

- Implement the digital Gynea program in clinical settings:
 - Recruit women who have completed treatment for gynaecological cancer
 - Replace some nurse-led follow-up phone calls with digital chat support throughout the program.
 - Evaluate the effectiveness and user experience of digital interventions

Highlights for 2023/2024:

- Development and completion of the *Gynea* feasibility study
- Completion of the PhD theses by Sigrund Breistig and Elen Siglen
- Completion of a review with researchers in a Nordic network on sexual health among women treated for vulvar cancer
- Publication of several peer-reviewed articles (see below)

Sekse, R. J. T., & Augestad, M. (2025). A digital psycho-educative program addressing women's fear of cancer recurrence: A qualitative thematic analysis of informants' own written texts. *Nordic Journal of Nursing Research*, 45, 20571585251343259.



Gynea -et digitalt lærings- og mestringsprogram for deg som har hatt underlivskreft.

Introduksjon

Denne modulen handler om hverdagen etter kreftdiagnosen og behandlingen. Du vil få mye til kunnskap som kan hjelpe deg med å håndtere livet etter sykdom og behandling. Du vil lære om ulike utfordringer fra klinikk og på fortløpende oppfølging.

Du kan kontakte oss eller andre brukere i gruppen. Du er faktisk kunnet kontaktet av andre brukere som har vært gjennom underlivskreft.

Du vil også få muligheten til å skrive med egne erfaringer og tanker omkring kreftsykdommen. Modulen vil bli oppdatert og oppdatert med en ny utgave av dette. Til slutt får du innblikket i programmet og hvordan det fungerer.

Vi ønsker deg velkommen til

Gå videre

Programmet er utviklet av helsepersonell og forskere ved Haukeland universitetssjukehus, i samarbeid med brukerrepresentanter i Gynkreftforeningen, og tilbys kvinner som har vært gjennom underlivskreft, og som ønsker mer kunnskap om, og oppfølging etter behandling.

Programmet består av 6 moduler. En gang i uken får du en ny modul med informasjon, verktøy og øvelser som skal være til støtte for deg.

Sekse, R. J. T., Breistig, S., & Synnes, O. (2025). Processing the trauma of gynaecological cancer through reading and writing: Women's experiences from digital storytelling after treatment. *Health Care for Women International*, 1-19.

Myklebost, S. B., Bevan, K. G., Hauken, M. A., Sekse, R. J. T., Schmid, M. T., Spjeld, S. H., ... & Nordgreen, T. (2025). Self-management of cognitive impairments: a qualitative study of cancer survivor coping strategies. *Supportive Care in Cancer*, 33(9), 1-7.

Breistig, S., Thorkildsen, K. M., Werner, H. M. J., Nordgreen, T., & Tveit Sekse, R. J. (2025). Women's lived experiences with nurse-supported digital rehabilitation after gynaecological cancer: A phenomenological hermeneutic study. *Nordic Journal of Nursing Research*, 45, 20571585251332162.

Breistig, S., Thorkildsen, K. M., Werner, H. M. J., Nordgreen, T., & Sekse, R. J. T. (2024). Redefining sexual health after gynaecological cancer: Lived experiences from Gynea, a digital rehabilitation programme. *Journal of Clinical Nursing*, 33(3), 1110-1121.

Breistig, S., Thorkildsen, K. M., & Sekse, R. J. T. (2024). Gynecological cancer survivors' experiences and desire for follow-up after recent treatment: A phenomenological hermeneutic study. *Cancer Nursing*, 47(5), E327-E335.

Siglen, E., Vetti, H. H., Augestad, M., Steen, V. M., Lunde, Å., & Bjorvatn, C. (2023). Evaluation of the rosa chatbot providing genetic information to patients at risk of hereditary breast and ovarian cancer: qualitative interview study. *Journal of Medical Internet Research*, 25, e46571.

Olesen, M. L., Seibæk, L., & Sekse, R. J. T. (2023). Impaired sexual health among women treated for vulvar cancer: An integrated review. *Journal of Clinical Nursing*, 32(17-18), 6212-6228.

Innovative Novel Ovarian Cancer Treatment Approaches (INOVA)

Research Group Leader: Line Bjørge and Emmet McCormack

Number of Group Members: 13

Research Focus in short:

- Ovarian cancer, vulva cancer
- Translational: profiling (single cell analysis, proteomics), preclinical models, clinical trials



Research Focus:

The INOVA research team focuses on high-grade serous ovarian carcinoma through the RETHINK initiative, aiming to transform tumour profiling into personalized care. Four programs drive this work: tumour microenvironment profiling, preclinical modelling, antibody-based diagnostics, and clinical translation. Key methods include multi-omics immunoprofiling, advanced 3D tumour modelling using decellularized tissue, and functional preclinical testing. This approach has led to biomarker discovery, improved immunotherapy strategies, and novel diagnostic tools. A similar strategy is now applied to vulvar cancer.

Current Projects:

- Generate personalized immunophenotyping tools through multi-omics profiling.
- Engineer 3D hybrid systems to model tumour–stroma interactions and enable functional therapeutic testing.
- Develop localized CAR-T cell therapy using custom peritoneum-derived hydrogels for surgery-assisted immunotherapy.
- Identify precision drugs targeting resistant subpopulations to overcome chemoresistance.

Highlights for 2023/2024:

- Development of multi-omics platforms to characterize the tumour microenvironment in ovarian and vulvar cancer.
- Establishment of advanced preclinical models for ovarian and vulvar cancer.
- Identification of immunosignatures for personalized therapy selection in ovarian cancer.
- Received major competitive grants from the Regional Health Authorities and the Trond Mohn Foundation.

CCBIO – Centre for Cancer Biomarkers

CCBIO is a research centre at the University of Bergen (UiB), originally established in 2013 as part of the Centres of Excellence (CoE) scheme by the Research Council of Norway.

Research Focus:

- Cancer biomarkers and targeted therapy
- Mechanisms showing how tumour microenvironment affects cancer cell behaviour, proliferation, and prognosis

Leadership: Centre Director: Lars A. Akslen. Co-Directors: Line Bjørge and Carina Strell.

Funding Sources: University of Bergen, Research Council of Norway, Norwegian Cancer Society, Helse Vest, Trond Mohn Research Foundation, International grants

Research Teams

- Tumour-Microenvironment Interactions
- Discovery and Validation of Cancer Biomarkers
- Clinical Applications and Early Trials
- Ethics, Economics and Priorities

Education and Outreach

- CCBIO Research School for Cancer Studies (RSCS): Offers ECTS-accredited courses in translational cancer research, open to UiB students and external researchers.
- CCBIO Annual Symposium: A major yearly event showcasing research and fostering collaboration.
- Junior Scientist Symposium: Quarterly events aimed at PhD students and postdocs, open to senior researchers as well.

Haukeland University Hospital's Contribution to CCBIO

Haukeland University Hospital is a key clinical and academic partner in CCBIO's translational cancer research. The hospital contributes through:

- Joint affiliations: Most principal investigators (PIs) affiliated with CCBIO hold joint positions at Haukeland University Hospital and the University of Bergen. Their academic affiliation at UiB are linked to CCBIO, ensuring strong integration between clinical practice and research activities and facilitating seamless collaboration between basic research and clinical practice.
- Clinical integration: Many of CCBIO's biomarker studies are conducted in collaboration with clinical departments at Haukeland, ensuring relevance to patient care and access to clinical data and biobank material.
- Research infrastructure: Advanced technologies such as imaging mass cytometry and single-cell analytics are implemented in clinical settings at Haukeland, supporting real-time functional diagnostics and adaptive therapy development.
- Education and training: CCBIO's courses, including the CCBIO Research School for Cancer Studies, are regularly held at Haukeland, involving clinicians and researchers in teaching and mentoring.
- Clinical trials and early-phase studies: Haukeland provides the platform for testing new biomarker-driven therapies, especially in haematological malignancies and solid tumours.

Read more about CCBIO and ongoing research here: [CCBIO – Centre for Cancer Biomarkers | UiB](#)

Research grants 2024

Selected research grants awarded to researchers affiliated with Haukeland University Hospital.

Research grants from the Norwegian Cancer Society

Website: [210 millioner til kreftforskning – gir nytt håp til fremtidens pasienter – Kreftforeningen](#)

A total of eight research projects from Bergen received funding from the Norwegian Cancer Society, and 61 million kroner went to Helse Bergen and the University of Bergen. This emphasizes the increasing importance of interdisciplinary collaboration and research outside the capital, providing a significant boost to cancer research in Bergen.



From the left: Head of the Cancer Clinic Oddbjørn Straume, Head of Research at Haukeland University Hospital Vibeke Vold, Chief Physician Eli Sihn Samdal Steinskog, Professor Halfdan Sørbye, Chief Physician Hrvoje Miletic.

Research grants from the Research Council of Norway

Grant type: Researcher Project for Experienced Researchers (FRIPRO).

Project title: The timing and causes of pathogenic embryonic BRCA1 epimutations

Research grant: NOK 12.000.000

Project lead: Stian Knappskog (UiB/HUS)

Synopsis of research project: Can we reduce the risk of cancer already while the child is in the mother's womb? In some patients with aggressive breast or ovarian cancer, the disease is caused by a genetic change that occurred while the woman herself was a foetus in her mother's womb.

Researchers at the University of Bergen (UiB) are receiving 12 million NOK to investigate exactly when and why this change happens. Perhaps the change can be prevented?

Grant type: National infrastructure

Project title: National proton therapy research infrastructure (pre-project)

Research grant: NOK 2.000.000

Project lead from UiB/HUS: Liv Bolstad Hysing (UiB/HUS)

Website: [Midler til forskningsinfrastruktur av nasjonal viktighet](#)

Synopsis of research project: Proton therapy, a more precise and less toxic form of radiation treatment, will be available in Norway from December 2024. Currently, children and young patients are sent abroad for this treatment. Beyond reducing side effects, proton therapy holds promise for broader clinical applications, necessitating extensive research.

This pre-project aims to coordinate the establishment of a national research infrastructure for proton therapy, supporting both experimental and clinical studies. The initiative is aligned with national goals, including treating 75% of patients within clinical trials, and is part of the strategic roadmaps of Oslo University Hospital and Haukeland University Hospital.

The project is structured into three work packages:

1. **Technical Infrastructure Planning** – Identifying solutions to bridge current capabilities with future needs and coordinating infrastructure distribution across institutions.
2. **Research Development** – Exploring innovative research directions and identifying areas where Norway can lead.
3. **National Coordination and Communication** – Engaging stakeholders, developing communication strategies, and anchoring plans at national institutions.

The main deliverable will be an approved national infrastructure plan with long-term funding, forming the basis for a full application to establish a national proton therapy research infrastructure.

Trond Mohn Research Foundation

Women's Health Research in Bergen: DRIV – Centre for Women's Health Research

Website: [Tildeling kvinnehelse - Mohnfoundation](#)

Total grant: NOK 50.000.000

As part of a 50 million NOK initiative to strengthen women's health research in Bergen, the Trond Mohn Research Foundation (TMF), in collaboration with the University of Bergen (UiB) and Helse Bergen, is funding several projects—two of which are directly related to cancer:

1. Early Embryonic Epimutations and Female Cancer

- **Principal Investigator:** Stian Knappskog (UiB/ HUS)
- **Focus:** Investigates how epigenetic changes during foetal development may contribute to aggressive cancers such as triple-negative breast cancer. The research may also shed light on mechanisms behind other female-specific diseases.

2. Rethinking Ovarian Cancer – Immunotherapy Innovation

- **Principal Investigator:** Line Bjørge (UiB/ HUS)
- **Focus:** Develops personalized immunotherapy strategies for ovarian cancer, including CAR-T cell approaches. The goal is to establish a clinical immunotherapy program tailored to ovarian cancer patients.

Research grants Helse Vest

Website: [Tildeling av Helse Vest sine forskingsmidlar 2024 - Helse Vest RHF](#)

Project: Biomarkers and patient characteristics related to response and resistance to treatment with immune checkpoint inhibitors in patients with lung cancer

Candidate: Fabian Gärtner – Helse Bergen HF

Grant: PhD fellowship (50% over 6 years)

Project: Advanced functional imaging and abdominal adiposity markers for better prognostication and tailoring treatment in endometrial cancer

Candidate: Jostein Sæterstøl – Helse Bergen HF

Grant: PhD fellowship (50% over 6 years)

Project: Single cell immune and signalling profiling guiding cancer therapy

Project lead: Bjørn Tore Gjertsen – Helse Bergen HF

Grant: NOK 1.500.000

Project: Clinical implementation of imaging and molecular markers for Endometrial Cancer

Project lead: Camilla Krakstad – Helse Bergen HF

Grant: NOK 1.500.000

Project: Predictive Biomarkers for Immunotherapy in Head and Neck Cancer

Project lead: Daniela Elena Costea – Helse Bergen HF

Grant: NOK 1.500.000

Project: Improving breast cancer treatment outcomes

Project lead: Gunnar Mellgren – Helse Bergen HF

Grant: NOK 1.500.000

Project: Combining cutting edge technologies for target discovery in brain tumours

Project lead: Hrvoje Miletic – Helse Bergen HF

Grant: NOK 1.500.000

Project: Improving pharmacological and cellular treatment for human acute myeloid leukaemia

Project lead: Håkon Reikvam – Helse Bergen HF

Grant: NOK 300.000

Project: Stratification of breast cancer by proteomic classification

Project lead: Lars Andreas Akslen – Helse Bergen HF

Grant: NOK 1.500.000

Project: KidImmune – Autoimmunitet i barnekraft

Project lead: Ola Myklebost – Helse Bergen HF

Grant: NOK 320.000

PhD defences

Cancer related PhD defences affiliated with Haukeland University Hospital

Kristine Fjellanger

Date of PhD defence: March 19, 2024

Thesis title: Improving photon and proton radiotherapy of locally advanced non-small cell lung cancer
University of Bergen, Department of Physics and Technology

Main supervisor: Liv B. Hysing (HUS/UiB)

Co-supervisors: Ben J. M. Heijmen (Erasmus MC) and Helge E. S. Pettersen (HUS)

More information (in Norwegian): [Nye metoder for bedre strålebehandling av lungekreft | Nye doktorgrader | UiB](#)

Ole Vidhammer Bjørnstad

Date of PhD defence: May 31, 2024

Thesis title: Neural Interactions in the Breast Cancer Microenvironment

University of Bergen, Department of Clinical Medicine and CCBIO

Main supervisor: Heidrun Vethe

Co-supervisors: Professor Lars A. Akslen, Ph.D. Manuel Carrasco Fernandez og Ph.D. Dimitrios Kleftogiannis

More information (in Norwegian): [Nevrale Interaksjoner i Brystkreftmikromiljøet | Nye doktorgrader | UiB](#)

Simon Humberto Storevik

Date of PhD defence: June 3, 2024

Thesis title: Contact-dependent cell communication and mitochondria transfer in the glioblastoma microenvironment

University of Bergen, Department of Biomedicine

Main supervisor: Hrvoje Miletic

Co-supervisors: Rolf Bjerkvig

More information (in Norwegian): [Mitokondrieoverføring fra hjerneceller til hjernekreftceller | Nye doktorgrader | UiB](#)

Kristin Bentung Lygre

Date of PhD defence: June 14, 2024

Thesis title: Improving surgery and prognostication in right-sided colon cancer

University of Bergen

Main supervisor: Professor Frank Pfeffer

More information (in Norwegian): [Standardisert og trygg kirurgi ved høyresidig tykktarmskreft | Nye doktorgrader | UiB](#)

Christiane Helgestad Gjerde

Date of PhD defence: June 24, 2024

Thesis title: Development of Advanced 3D Ovarian Carcinoma Models – Using a Decellularized Peritoneal Scaffold to Model the Extracellular Matrix

University of Bergen, Department of Clinical Science / CCBIO

Main supervisor: Professor Line Bjørge

Co-supervisors: Professor Emmet McCormack and researcher Katrin Kleinmanns

More information (in Norwegian): [Avansert 3D-modell for kreft i eggstokkene | Nye doktorgrader | UiB](#)

Karen Rosnes Gissum

Date of PhD defence: June 28, 2024

Thesis title: Unveiling the Complexities: Patients' and Healthcare Providers' Perspectives on Understanding and Managing Ovarian Cancer.

Main supervisor: Line Bjørge, Professor UiB

Co-supervisors: Roger Strand og Ingvild Vistad, samt 1. amanuensis Sigrunn Drageset og forsker Liv Cecilie V. Thomsen

More information (in Norwegian): [Ulike perspektiver på å forstå og håndtere eggstokkreft | Nye doktorgrader | UiB](#)

Saruar Alam

Date of PhD defence: August 28, 2024

Thesis title: Multiparametric brain MRI and deep learning models applied to segmentation and prediction in patients with glioma

University of Bergen, Department of Biomedicine

Main supervisor: Professor Arvid Lundervold

Co-supervisor: Professor Martha C. Enger

More information (in Norwegian): [Dyplæring for deteksjon og karakterisering av hjernesvulst | Nye doktorgrader | UiB](#)

Hilde Eide Lien

Date of PhD defence: September 13, 2024

Thesis title: Single cell expression patterns in endometrial cancer and novel biomarkers for improved treatment

University of Bergen, Department of Clinical Science / CCBIO

Main supervisor: Professor Camilla Krakstad

Co-supervisors: Professor Lars A. Akslen and professor Ingrid Salvesen Haldorsen

More information (in Norwegian): [Biomarkers for improved treatment of endometrial cancer | Centre for Cancer Biomarkers CCBIO | UiB](#)

Birte Fagerdal

Date of PhD defence: October 3, 2024

Thesis title: Exploring Adaptive Capacity in Hospital Teams: A Multiple Case Study.

University of Stavanger, Faculty of Health Sciences

Main supervisor: Siri Wiig, Professor, University of Stavanger

Co-supervisors: Janet Anderson, Professor, Monash University, Australia. Veslemøy Guise, Associate Professor, University of Stavanger, Hilda Bø Lyng, Associate Professor, University of Stavanger

More information (in Norwegian): [Public defense: Birte Fagerdal | University of Stavanger](#)

Austin James Rayford

Date of PhD defence: October 11, 2024

Thesis title: Studies on the effect of AXL inhibition in non-small cell lung cancer

University of Bergen, Department of Biomedicine

Main supervisor: Professor James B Lorens

Co-supervisors: Agnete Engelsen and David Micklem (BerGenBio).

More information (in Norwegian): [Kan kreftbehandling med immun-sjekkpunkt hemmere forbedres? | Nye doktorgrader | UiB](#)

Kari Strøno Wagner-Larsen

Date of PhD defence: November 15, 2024

Thesis title: Advanced MRI for developing more personalized treatment strategies in uterine cervical cancer

Main supervisor: Professor Ingfrid S. Haldorsen

Co-supervisors: Professor Camilla Krakstad og professor Noeska Smit

More information (in Norwegian): [MR avdekker nøkkemarkører i kampen mot livmorhalskreft | Nye doktorgrader | UiB](#)

Sara Barranco Campos

Date of PhD defence: November 22, 2024

Thesis title: Redesigning Clozapine

University of Bergen, Department of Chemistry

Main supervisor: Professor Hans-René Bjørsvik

Co-supervisors: Associate Professor Tom Christian Holm Adamsen og Professor Jørn Hansen

More information (in Norwegian): [Bruk av antipsykotika for kreftbehandling | Nye doktorgrader | UiB](#)

Sina Thorsen Takle

Date of PhD defence: November 27, 2024

Thesis title:

University of Bergen, Department of Biomedicine

Main supervisor: Professor Nils Halberg

Co-supervisors: Professor Eivind Valen

More information (in Norwegian): [Fedmes rolle i dannelselse og utvikling av brystkreft | Nye doktorgrader | UiB](#)

Line Sagerup Bjørland

Date of PhD defence: December 6, 2024

Thesis title: Prognostic factors, treatment approach and clinical outcomes from glioblastoma: a population-based observational cohort study from Western Norway

University of Bergen, INSTITUTT / FAK

Main supervisor: Adjunct Professor Elisabeth Farbu

Co-supervisors: Professor Kathinka Kurs, Ph.D. Bjørnar Gilja and Professor Øystein Fluge

More information (in Norwegian): [Overlevelse ved glioblastom–virkelighetsdata fra Helse Vest | Nye doktorgrader | UiB](#)

Eirik Tveit Solheim

Date of PhD defence: December 10, 2024

Thesis title: Paraneoplastic cerebellar degeneration: Exploring the roles of the cerebellar degeneration-related proteins and exosomal microRNAs

University of Bergen, Department of Clinical Medicine

Main supervisor: Professor Christian Alexander Vedeler

Co-supervisors: PhD Cecilie Totland and PhD Fiona Dick

More information (in Norwegian): [Når immunforsvaret angriper lillehjernen | Nye doktorgrader | UiB](#)

Edda Óttarsdóttir

Date of PhD defence: December 13, 2024

Thesis title: Subjective and objective language functions in glioma patients during longitudinal follow-up. Associations with quality of life, psychological distress and fatigue.

University of Bergen, Department of Biological and Medical Psychology

Main supervisor: Eike Wehling

Co-supervisors: Karsten Specht

More information (in Norwegian): [Språkfunksjon i gliompasienter | Nye doktorgrader | UiB](#)

News

Publication dashboard

The Publication Dashboard is a digital tool that provides a consolidated and up-to-date overview of scientific publications affiliated with Helse Bergen. The dashboard retrieves data from PubMed and organizes the information by institutional affiliation, relevant keywords, and research areas. This makes it easy to see who is publishing what, and within which fields. In addition, the dashboard displays the journals' impact factors, offering a measure of the scientific influence of the publications.

The tool helps highlight research activity and quality, both internally and externally.

The Research Dashboard is available in the Report Portal under "Other Reports" → "Published Articles (PUBMED)".

Project Manager: Pål Ove Vadset, Health Service Development

The screenshot displays the Publication Dashboard interface. At the top, there are three filter tabs: "Tabell", "Tidsserie", and "Klinikk". A box on the right shows a count of 6577 articles. Below the tabs are several filter dropdown menus for "Forfatternavn", "Tidsskrift", "År", "Nøkkelord", "Artikkeltyper inkludert", "PMID", "HUS", "Enhet", "Samarbeidsland", and "Artikkeltyper ekskludert". The main part of the dashboard is a table with the following columns: PMID, Tittel, Tidsskrift, Publikasjonsår, and Forfatterliste. The table lists several publications, with some author names in bold to indicate affiliation with Helse Bergen. At the bottom, there are checkboxes for "Dropp eksterne forfattere" and "Fulle navn", and a date "Sist oppdatert: 02.09.2025".

PMID	Tittel	Tidsskrift	Publikasjonsår	Forfatterliste
39287916	Physical activity behaviors and screen time in young childhood cancer survivors: the Physical Activity in Childhood Cancer Survivors Study.	J Cancer Surviv	2024	Bratteteig M, Rueegg CS, Lie HC, Thorsen L, Larsen EH, Larsen MH, Torsvik IK , Götte M, Järvelä LS, Kriemler S, Larsen HB, Anderssen SA, Ruud E, Grydeland M
39287766	Framing openness: Exploring Similarities and Differences in Patients' and Their Social Networks' Experiences with Participating in Dialogical Network Meetings Through the Lens of Mattering.	Community Ment Health J	2024	Omvik S, Andersland R , Kalsås ØR
39288351	Reply to M. Kamrava and F. Montorsi et al.	J Clin Oncol	2024	Ekanger C, Helle SI, Kvåle R, Reisæter L, Gravdal K, Honoré A, Dahl O
39299770	Surgery for intestinal injuries in very preterm infants: a Norwegian population-based study with a new approach to disease classification.	BMJ Paediatr Open	2024	Hapnes NC, Stensvold HJ, Bjørnland K, Sæter T, Guthe HJT , Støen R, Moltu SJ, Rønnestad A, Klingenberg C, Norwegian Neonatal Network
	Exposure to Per- and Polyfluoroalkyl			Forthun IH , Roelants M, Knutsen HK, Haug LS, Iszatt N, Schell LM,

Research and Study Nurse Network at Haukeland University Hospital

A dedicated professional network for research and study nurses has been established. The initiative aims to strengthen collaboration, foster knowledge exchange, and support professional development for nurses involved in clinical research—across all medical specialties.

To date, the network has hosted meetings in both in-person and hybrid formats to ensure broad participation from departments and units across the hospital. Each meeting has focused on a key theme, featuring presentations, open discussions, and the sharing of practical experiences. These sessions are designed to build expertise and reinforce the essential role of study nurses in advancing clinical research.

The network highlights the critical contribution of study nurses in planning, conducting, and maintaining quality in clinical studies. It also serves as a strategic resource for promoting excellence in research activity throughout the hospital.

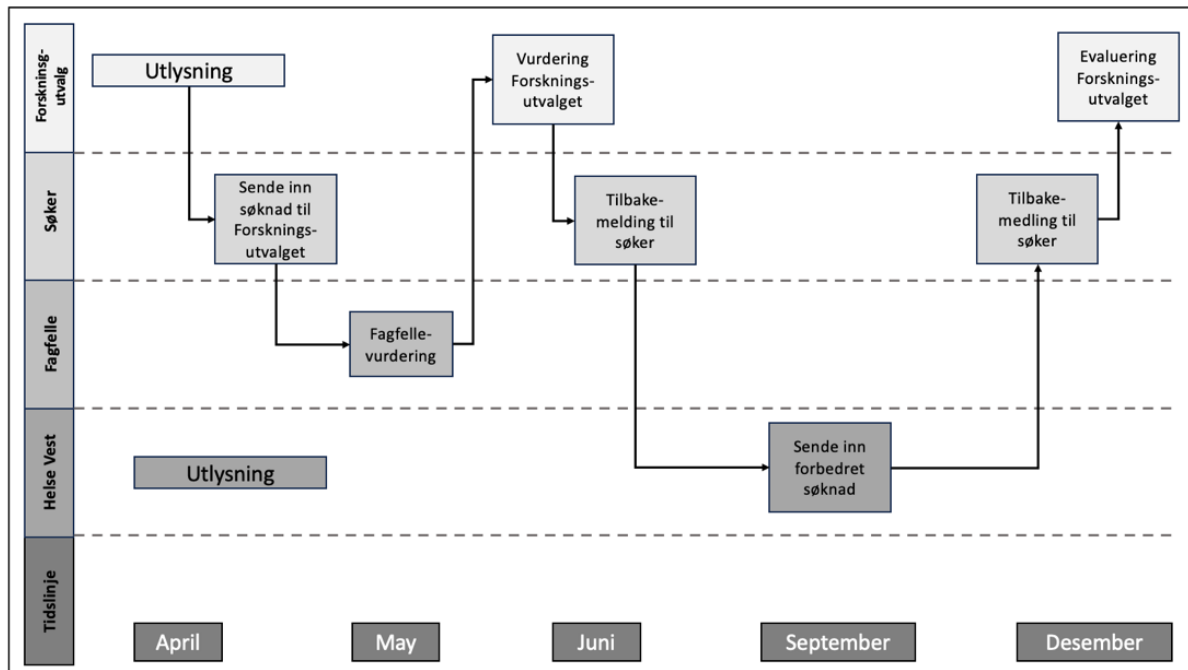
Starting in autumn 2025, regular quarterly meetings will be introduced to ensure continuity and further strengthen this professional community.



Establishing Pre-Evaluation of Grant Proposals

One of the key mandates of the Research Council is to provide strategic advice on large and complex grant proposals. Requests for support may be initiated by individual applicants, departments, or clinical units.

The Research council will also give early-career cancer researchers the opportunity to obtain a formative pre-review several months before the final submission deadline (see illustration below).



Planned process for pre-review process and evaluation of grant proposals

Patient involvement in research

Over the past five years, systematic involvement of patients and user representatives throughout all phases of translational and clinical cancer research has become an integral component of the hospital's activities. User representatives contribute by offering researchers the patient perspective on issues related to their studies. They may also assist in improving communication with study participants, including simplifying complex language. This collaboration has led to demonstrable improvements in participant recruitment and patient care within ongoing studies, as well as a more efficient project design and implementation.

Engagement of users has also strengthened the communication of research outcomes to the broader public and contributed to the generation of real-world data of higher relevance and quality. The collaboration between users and researchers is characterized by mutual benefit, encompassing regular meetings, educational initiatives, participation in research applications, and joint contributions to health policy discussions and media communication.

Through this partnership, the hospital has established a sustainable framework for user involvement that enhances research relevance, ethical robustness, and societal impact—core elements in the mission of a comprehensive cancer centre.

Research infrastructure

A selection of research infrastructure at Haukeland University Hospital.


Clinical trial units for adults and children

The Clinical trial units at Haukeland University Hospital provides dedicated infrastructure for the conduct of early-phase clinical trials, with a particular focus on phase I and II studies. The unit facilitates high-quality, GCP-compliant research across a wide range of therapeutic areas, including oncology. It offers services such as patient monitoring, sample handling, medication administration, and coordination of study visits. The unit collaborates closely with clinical departments, research sponsors, and the hospital's research administration to ensure safe and efficient trial execution.

The Early phase CTU for adults at HUS is located in the heart of the hospital campus and serves all the clinical departments at the university hospital as well as the regional health trust hospitals.


- The CTU is also open for patients from other regions
- Strong collaboration with researchers at University of Bergen
- National and international collaborators
- High level specialization within all health disciplines; also harboring national functions
- Capacity for Advanced Therapy Medicinal Products (ATMPs) for innovative biological therapies, including gene, cell, and tissue-engineered products

Current activity clinical studies	No
In total (active, planned)	38
Sponsor	
Researcher/institution	13
Industry	25
Clinical phase	
Phase I	3
Phase II	10
Phase III (IV)	14
Other	1



Types of studies

- Human pharmacotherapy and methodology
- Translational research
- **Early phase trials**
- Advanced phase III-studies
- Academic/researcher-initiated studies

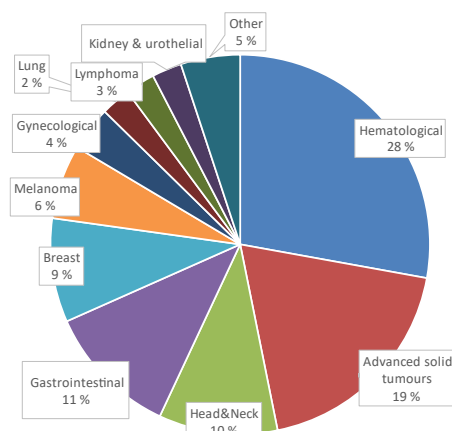


Strategic aims

- Offer experimental therapy to patients with unmet needs
- Diversity (diagnoses/intervention/departments)
- Coordinate complex studies involving multiple clinical departments/diagnoses

Portfolio clinical studies CTU HUS 2014 - 2024

Clinical studies 2014 - 2024	123
Diagnoses	
Oncology	79
Other	44
Clinical phase	
Phase I	19
Phase II	49
Phase III	48
Other	7



Research Unit for Health Surveys

Research Unit for Health Surveys (FHU) is a collaborative initiative between the University of Bergen and Haukeland University Hospital, established in 2017 with support from the Trond Mohn Foundation. The unit is a professionalized core facility administered by the Department of Clinical Science at the Faculty of Medicine, dedicated to facilitating high-quality clinical studies involving both healthy volunteers and patients across a wide range of medical disciplines.

FHU supports studies in fields such as nutritional science, pharmacology including vaccine development, epidemiology, patient-reported outcomes (PROMs), and cancer research. The unit has expertise in Good Clinical Practice (GCP), randomized controlled trials and other intervention studies, testing of medical equipment, surveys, and many other study types. FHU is equipped with both modern facilities tailored for clinical trial activities that do not require hospital infrastructure, as well as e-infrastructure for decentralized studies.

FHU has hosted numerous research projects since its inception, including observational studies, interventional studies, clinical drug trials and retrospective observational studies, and continues to play a vital role in advancing population health research at both national and local levels.

Website: [Forskningsenhet for helseundersøkelser | Universitetet i Bergen](https://www.fhu.uib.no/)



Biobank Haukeland

Biobank Haukeland is a biobanking infrastructure located at Haukeland University Hospital. It provides comprehensive services for the collection, processing, and long-term storage of human biological material for research. The biobank operates in close collaboration with other laboratories in the hospital's Laboratory Clinic and is fully embedded in the hospital's logistics and laboratory systems.

The infrastructure features a fully automated sample distribution and storage system, including a high-capacity freezer unit and a digital tracking system (LabVantage) for secure and traceable sample management. The biobank plays a key role in enabling high-quality biomedical research and supports both internal and external research collaborations.



ResearchPACS

Hauke Bartsch, Associate Professor at the University of Bergen and affiliated with Haukeland University Hospital, leads the development of a research information system that integrates electronic data capture with a picture archiving and communication system (PACS) for medical imaging. This system, referred to as Research PACS (ForskningsPACS), is designed to support clinical and translational research by enabling secure storage, management, and analysis of imaging and associated clinical data. The infrastructure facilitates advanced research in fields such as oncology, neuroscience, and radiology, and supports multicentre studies and machine learning applications in medical diagnostics.

ForAN – Research Administrative Network

The ForAN network (Forskningsadministrativt nettverk) is a research administrative forum established by Haukeland University Hospital to strengthen coordination, competence sharing, and communication across departments involved in research. The network brings together research coordinators, administrative staff, and research leaders to support the implementation of national and regional strategies for clinical research. ForAN plays a key role in disseminating information, sharing best practices, and ensuring alignment with institutional quality systems and regulatory requirements.



Hybrid meeting in ForAN, on recent updates on healthcare legislation

Research and Innovation - administrative support

The Research and Innovation unit at Haukeland University Hospital is organised in the R & D department and responsible for facilitating research and innovation activities across the institution. Its mission is to ensure that the hospital's systems for clinical research are practical, efficient, and user-friendly, making it easy for researchers to comply with regulations and best practices.

Research and Innovation provides a wide range of services at the local, regional, and national levels, including:

- Operational support and guidance for researchers and research projects, including a GCP-monitoring Unit, Data Management service, Statistics and contracting
- Training and advisory services, including GCP-training and study nurse courses
- Strategic development and policy work
- Coordination of research networks

Key focus areas include clinical trial support, research funding and analysis, medical quality registries and health data, legal advisory services, and early-phase decision support for new methods. The section also manages the hospital's clinical research units for both adults and children.

Research networks (regional and national):

A selection of regional and national research networks

InPreD – Infrastructure for precision diagnostics

InPreD (Infrastruktur for presisjonsdiagnostikk) is a national initiative in Norway focused on implementing advancing precision diagnostics in healthcare, particularly for cancer. By integrating cutting-edge genomic technologies, molecular analyses, and bioinformatics, InPreD aims to provide more accurate and tailored diagnostic solutions, enabling personalized treatment plans for patients. The initiative collaborates with hospitals, research institutions, and health authorities to establish a unified infrastructure, ensuring equal access to advanced diagnostics across the country. Through its efforts, InPreD contributes to the implementation of precision medicine in Norway, enhancing early detection, treatment outcomes, and overall patient care.

PRESIMAL

PRESIMAL brings together several of Norway's leading research environments within precision imaging and machine learning. The network will facilitate research related to machine learning in precision medicine with a special focus on medical imaging, across imaging methods and diseases. The network aims to promote the development of more precise diagnostic imaging methods allowing better prognostication and tailoring of treatment. Through the exchange of imaging data, methods, infrastructure and interdisciplinary expertise in precision imaging, the network will provide a hub for accelerating these endeavours. Furthermore, the network will stimulate the establishment of national digital platforms for testing machine learning algorithms in clinical practice, thus add momentum for translating machine learning algorithms into potential clinical implementation.

Several network activities will be organized: conferences, workshops, research courses and organization of competitions. Travel grants for researchers visiting other relevant institutions will be awarded.

PRESIMAL is managed and coordinated by the Mohn Medical Imaging and Visualization Centre (MMIV). The network coordinator for PRESIMAL is Associate Professor Eli Eikefjord. She is responsible for coordinating and heading PRESIMAL together with Professor Ingrid S. Haldorsen, Associate Professor Alexander S. Lundervold, Associate Professor Noeska Smit and Associate Professor Hauke Bartsch at MMIV, Department of Radiology, Haukeland University Hospital in Bergen.

Website: [PRESIMAL | MMIV](#)

List of publications 2024

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