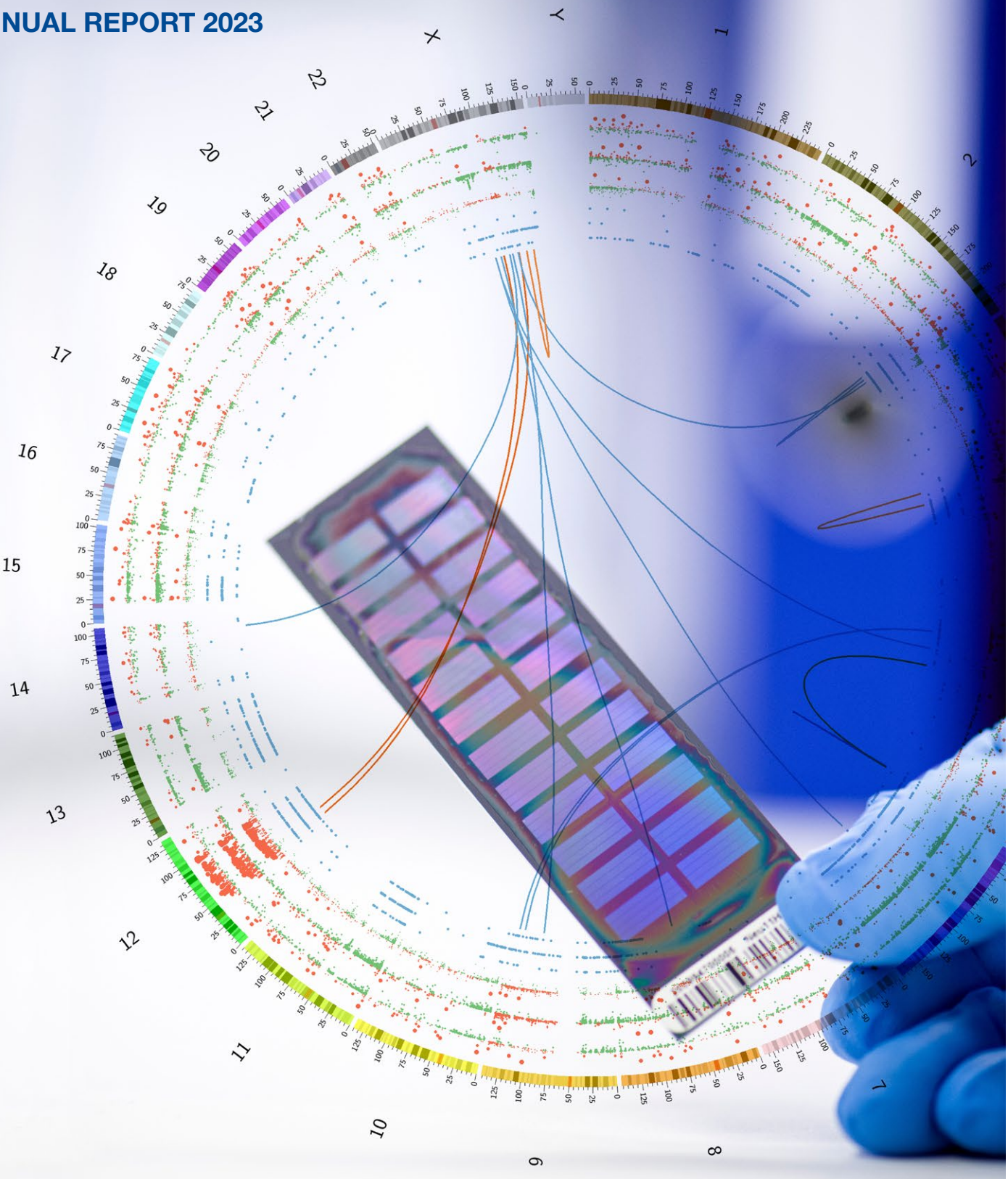
INSTITUTE FOR CANCER RESEARCH

ANNUAL REPORT 2023



OSLO UNIVERSITY HOSPITAL | HELSE SØR-ØST

UNIVERSITY OF OSLO

“Research and innovation with patient benefit in mind”

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FRONT PAGE:
The circular Circos plot represents the whole genome of three metastases from a liposarcoma patient (Myklebost, Lorenz, Meza-Zepeda). The inner circles depict DNA copy number changes, whereas lines joining two chromosomal regions represent fusion transcripts within the tumours detected by RNA sequencing. The BeadArray glass slide is used to study genetic variation and DNA copy number changes. Data was generated by the Genomics Core Facility at the Department of Core Facilities. The instruments used to create the data were financed by the Radium Hospital Foundation, the Norwegian Cancer Society and the University of Oslo.

PAPER: 150/300 Profimatt
CIRCULATION: 800

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“the ICR sets out to maintain the excellent science and to further contribute to the grand challenges in cancer medicine”

DEDICATED TO CANCER RESEARCH

I am happy to present our Annual Report for 2023. The eleven key topics of the report encapsulates the work and output from our research organisation, the Institute of Cancer Research (ICR), and it communicates the key features of what we do. Alongside outstanding research, the report also demonstrates how we excel in recruitment, training and career development, translation and innovation, dissemination and public outreach, and in collaboration in Norway and abroad.

Notably, ICR groups are key partners in more than 20 clinical trials and lead more than 120 translation and innovation projects, many with industry partners. Members of the ICR also gave more than 350 scientific and popular talks, organised some 60 meetings and events, disseminated our science, and participated in the public debate with close to 250 news items in 2023.

As you will see, however, our scientific output was down in 2023 compared to 2021 and 2022. We saw a surge in published papers in 2021, presumably as our staff, working from home during the pandemic, focused on writing and publishing papers. This was followed by a decrease towards normal in 2022 and below earlier levels last year. One possible explanation is that although we kept the institute open throughout the pandemic, allowing people to come in and do experiments, the need to keep distance and reduced presence, as well as the difficulties in getting laboratory consumables and spare parts, has affected production, and typically we see that with several years of delay. It may also be that our shift towards more translational and clinical research gives a longer time to output. I am glad to see that more than half of our production still has 1st or senior author at the ICR and that the research quality is the same (by median impact factor).

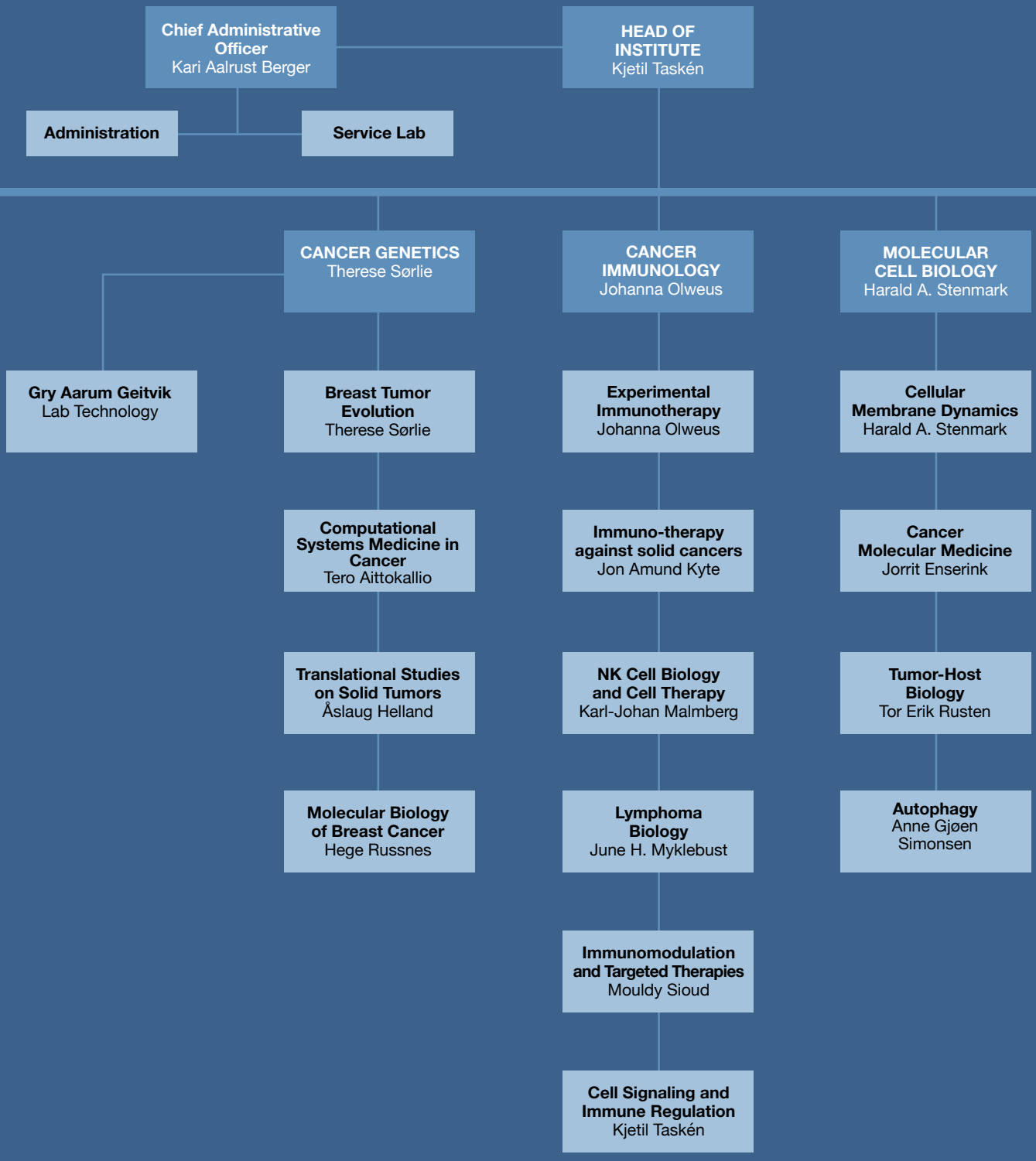
The competence of our staff is the most valuable asset of the ICR. Our 377 employees in 6 research departments, 26 research groups, 29 project groups and 6 core facility units represent a competence hub that allows Oslo University Hospital to establish new strategic areas. One example is in precision cancer medicine and another cell therapy, as we have the required expertise to pursue such new initiatives. These strategic developments also create new career paths. In 2023 we stepped up our involvement in radionuclide and preclinical proton therapy research (as described under Highlights and Core Facilities). We also welcomed Eirik Malinen as our new Head of the Department of Radiation Biology and Anne Gjøen Simonsen as a new Group Leader in Department of Molecular Cell Biology.

I encourage you to go through the report and see the highlights from our exciting research. In line with our vision, values, and objectives, the ICR sets out to maintain the excellent science and to further contribute to the grand challenges in cancer medicine, to continue to attract top talents, and to position the ICR in national and international alliances and consortia. Enjoy the reading!

March, 2024

Kjetil Taskén
Head of the ICR

THE INSTITUTE



6 research departments | **26** research groups | **6** core facilities | **29** project groups

The Institute for Cancer Research is organized in 6 research departments with 26 research groups and a total of >55 PIs, and one Department of (6) Core Facilities.

MOLECULAR ONCOLOGY
Ragnhild A. Lothe

- **Genetics**
  Ragnhild A. Lothe
- **Epigenetics**
  Guro Elisabeth Lind
- **Genome Biology**
  Rolf I. Skotheim

RADIATION BIOLOGY
Eirik Malinen

- **Preclinical and translational proton therapy**
  Eirik Malinen
- **Photochemical Internalization**
  Kristian Berg
- **Targeted Alpha Therapy**
  Asta Juzeniene
- **Clinical Radiation Biology**
  Heidi Lyng
- **Radiation Biology and DNA Damage Signaling**
  Randi Syljuåsen

TUMOR BIOLOGY
Gunhild M. Mælandsmo

- **Metastasis Biology and Experimental Therapeutics**
  Gunhild M. Mælandsmo
- **Translational Cancer Therapy**
  Kjersti Flatmark
- **Computational Cancer Genomics**
  Eivind Hovig
- **Molecular Biology of Sarcomas**
  Jørgen Wesche

CORE FACILITIES
Leonardo A. Meza-Zepeda

- **Preclinical Proton Therapy and Imaging**
  Tord Hompland (from March 2024)
- **Genomics and Bioinformatics**
  Susanne Lorenz
- **Flow Cytometry**
  Idun Dale Rein
- **Advanced Light and Electron Microscopies**
  Ellen Skarpen

THE INSTITUTE
Administration

Chief Administrative Officer:
Kari Aalrust Berger / Employees: 10

Administration

Service Lab

Peter Wiedswang, Ikram Mahnin, Yili Gan, Gro Live Fagereng, Helene Wold Ranum, Mona Hagen, Karen-Marie Heintz, Kari Aalrust Berger and Linda Uv Mjøen. Absent: Yong Fang Po

The ICR administrative unit consists of ten people that provides support on a wide range of tasks:

- Budgeting and accounting for around 400 externally funded projects
- Support in application processes and grant writing
- Handling all HR-related tasks
- Health, Safety and Environment and management of technical installations in the building
- Public relations and ICR website, coordinating the ICT-support group
- Responsibility for ICR conference and meeting facilities
- Operating Service Lab with washing and autoclaving facility for the building

"Serving to let our scientists excel at the ICR"

THE INSTITUTE

Scientific Advisory Board members

Professor
Carl-Henrik Heldin
Department of Medical Biochemistry and Microbiology, Uppsala University, Sweden. SAB Chair

Professor
Carl Figdor
Head, Dept of Tumor Immunology, Institute for Molecular Life Sciences, Radboud UMC, The Netherlands

Professor
Margaret C. Frame
FRSE, FmedSci, OBE, Professor of Cancer Research and Director, MRC Institute of Genetics and Molecular Medicine, University of Edinburgh, UK

Professor
Ruth Palmer
Institute of Biomedicine, University of Gothenburg, Sweden

Professor
Karen-Lise Garm Spindler
Department of Experimental Clinical Oncology, University of Aarhus; Consultant Oncologist, Aarhus University Hospital, Denmark

Professor Giulio Superti-Furga
Scientific Director, Research Center for Molecular Medicine (CeMM) of the Austrian Academy of Sciences, and Professor for Medical Systems Biology, Center for Physiology and Pharmacology Medical University of Vienna, Austria

Interactions with the Scientific Advisory Board

The Scientific Advisory Board (SAB) of the Institute for Cancer Research (ICR) at Oslo University conducted its 2nd visit and review in Oslo, May 9-10, 2023, and provided their report at the end of May.

In their report, **the SAB writes**: *"Overall, the SAB found the progress of ICR over the last two years to be very positive. The scientific production has been impressive with many publications reporting important findings and receiving a lot of attention". They also highlight:*

- *"Excellent leadership exerted, and important steps taken to enhance collaborations and interactions between basic scientists and clinicians."*
- *"Several new highly qualified PIs recruited who will strengthen the research at ICR."*
- *"ICR benefits from the Comprehensive cancer centre (CCC) at Oslo University Hospital, which provides a suitable environment with advanced treatment of cancer patients; importantly, ICR contributes significantly to the strength of the CCC in a two-way synergy."*

Furthermore, the SAB congratulated ICR for: *"the concerted effort to mount a vigorous, multi-pronged effort in precision oncology"* highlighting the nation-wide frameworks, infrastructures, and cancer trials InPreD, IMPRESS-Norway and CONNECT. And said that this is *"clearly based on a very robust foundation of excellent research on disease mechanism" and "a commendable commitment to technology development"*, and importantly that the ICR has *"created a robust and essential network of collaborations with the relevant clinical departments."* The SAB went on to say that: *"Seldom does one encounter a cancer research institute in which these modern approaches are equally pervasive as at ICR."*

According to the SAB the ICR precision oncology translational effort can be considered as composing four pillars:

1. *"Diagnostics and patient stratification based on genomic and other -omics methods, as well as other molecularly ascertained profiles and biomarkers allowing patient-specific or patient group-stratified recommendations for treatment.*
2. *Functional precision medical approaches in which samples of individual patients are treated ex vivo to measure responses to therapeutics, offering to the treating physician/tumor board suggestions based on functional measurements.*
3. *Cell-based therapies, involving T cells, NK cells and other, manipulated to acquire desired properties (here there is an intersection with gene therapy).*
4. *Small-molecule based therapies from new academic drug screening campaigns, repurposing of existing agents alone or in combination."*

Response to the report – The ICR has revised its strategy and objectives for 2023-25 and will:

- Pursue our strategic plan for developing cancer systems biomedicine.
- Continue to work with organizational development and pursue relevant funding opportunities.
- Continue the implementation of the ICR career development program.
- Maintain our focus on the recruitment of outstanding younger scientists nationally and internationally, while at the same time arranging for continuity and keeping key competencies.
- Continue developing clinical collaborations and improving our translation and innovation activities.
- Continue efforts to develop the precision medicine implementation initiative.
- Continue to develop the advanced cell therapy (ACT) centre.
- Continue to develop the strategy for radiation biology including preclinical research in the new proton therapy centre.
- Develop further core facilities and instrumentation as well as biobanking.

THE HIGHLIGHTS

Major Awards

Institute researchers received 14 prizes and honors in 2023, including King Olav V's Prize for Cancer Research to Åslaug Helland (picture) and Eric K. Fernström's Nordic Prize in Medicine to Harald Stenmark.

International conference organisation

Institute researchers were central in organizing the scientific program of >50 national and international scientific and popular meetings in 2023, including the first international Nordic Precision Cancer Medicine Symposium with 260 participants and 20 world-leading, international speakers and the 20th International Symposium of the Society for Natural Immunity with 465 delegates. (picture)

ICR Science Day

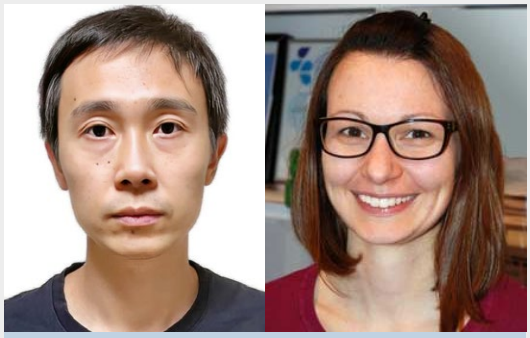
A project in 2023 has been to talk more about our own science at the ICR. This was the focus in a Group Leader gathering in January, and we have reorganized institute seminars to increase attendance and promote scientific discussion and encouraged journal clubs. The 1st ICR Science Day was organized by a committee from our Postdoc and PhD forum and had more than 240 attendants and >120 posters, a great success that will be repeated.

Major Funding

In 2023 Institute researchers were granted funding for more than 30 new projects (>250 mill NOK, see page 34), a particular highlight was the grant of A Cancer Grand Challenge grant (CRUK/NIH, 25 mill USD) to the MATCHMAKERS team with Johanna Olweus as one of 12 PIs. We also had the opening of the PRIMA CoE, and Mission Cancer project PRIME-ROSE and RadForsk-funded TARACAN were kicked off.

New Core Facility

A new Core Facility for Preclinical Proton Therapy Research was established and will start gearing up in 2024 as the OUH Proton Therapy Centre opens and will treat patients end 2024. The 80-100 ton cyclotron named after Ellen Gleditsch was lifted into the building in October.



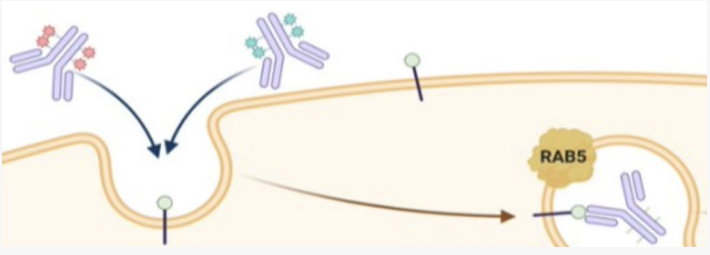
Recognition of our young talents

Youxian Li and Maja Radulovic won “Young Talent Grants” by the Research Council of Norway (Pictures). Among the prizes and honors were also awards to five younger scientists, Kushtrim Krye-ziu, Anette Weyergang, Mev Dominguez Valentin, Sigrid S. Skånland and Eirini Giannakopolou (see page 16).

Translational and clinical research

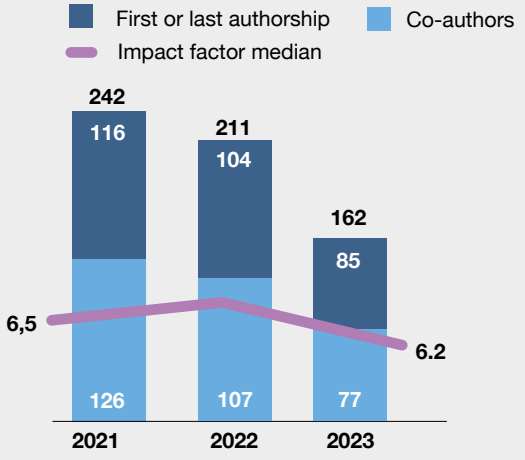
Institute researchers have >100 translational projects, are key in more than 20 ongoing clinical trials (page 43), including the IMPRESS trial now with >1500 patients screened and >350 included in treatment cohorts, and document >25 ongoing innovation projects and >10 industry collaborations. RAB Diagnostics is a new company spun-out in 2023 and gaining momentum.

RAB DIAGNOSTICS



THE ACHIEVEMENTS

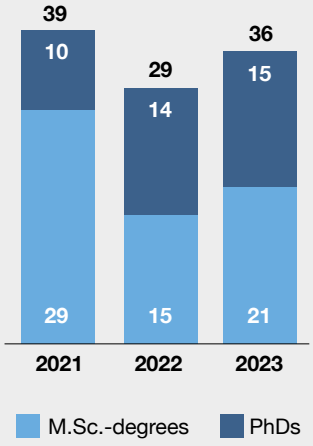
Articles published



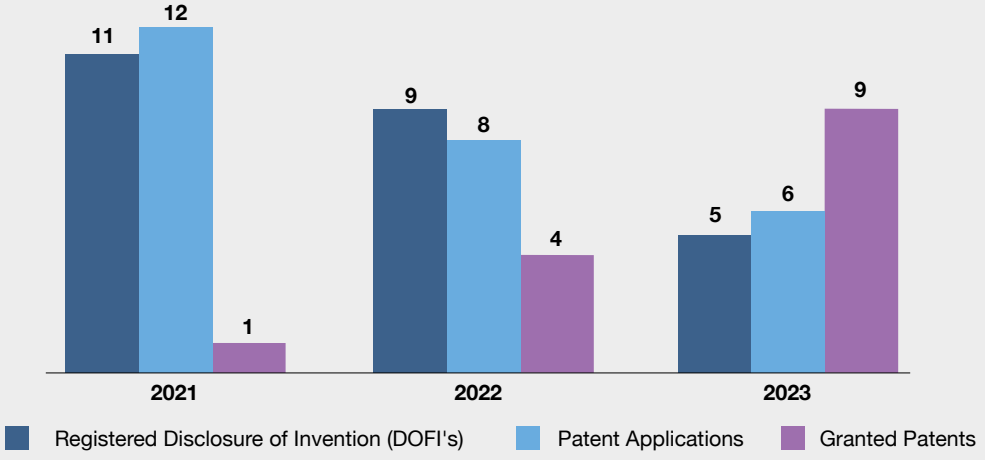
IMPACT FACTOR

	2021	2022	2023
Median	6.5	6.6	6.2
Mean	7.2	7.4	6.5

Completed PhDs and M.Sc.-degrees



DOFIs and Patent Applications



2

Selected papers with key authors from the Institute:

1. **Giannakopoulou E**, Lehander M, Virding Culleton S, **Yang W**, **Li Y**, Karpanen T, Yoshizato T, **Rustad EH**, **Nielsen MM**, **Bollineni RC**, Tran TT, **Delic-Sarac M**, **Gjerdingen TJ**, **Douvlataniotis K**, Laos M, **Ali M**, Hillen A, Mazzi S, Chin DWL, Mehta A, Holm JS, Bentzen AK, Bill M, Griffioen M, Gedde-Dahl T, Lehmann S, Jacobsen SEW, Woll PS, **Olweus J** (2023)
A T cell receptor targeting a recurrent driver mutation in FLT3 mediates elimination of primary human acute myeloid leukemia in vivo
Nat Cancer, 4 (10), 1474-1490

   Main finding: T cells targeting a driver mutation in the FLT3 tyrosine kinase domain can selectively eliminate human acute myeloid leukemia (AML) cells harboring the mutation, opening for a potentially effective TCR-based cell therapy for AML.

2. **Kaur N**, Carlsson SR, **Lystad AH** (2023)
The separate axes of TECPR1 and ATG16L1 in CASM
Autophagy, 20 (1), 214-215

   Main finding: Conjugation of autophagy-related protein 8 to single membranes (CASM) is independently facilitated by the components TECPR1 and ATG16L1, bringing new understanding to the CASM process in autophagy.

3. **Nähse V**, **Raiborg C**, Tan KW, Mørk S, Torgersen ML, **Wenzel EM**, Nager M, Salo VT, Johansen T, Ikonen E, **Schink KO**, **Stenmark H** (2023)
ATPase activity of DFCP1 controls selective autophagy
Nat Commun, 14 (1), 4051

   Main finding: The protein DFCP1 plays a crucial role in autophagy, particularly in the release of autophagosomes, that depends on its ATPase activity.

4. Chen Y, He L, Ianevski A, **Ayuda-Durán P**, Potdar S, Saarela J, Miettinen JJ, Kytölä S, Miettinen S, Manninen M, Heckman CA, **Enserink JM**, Wennerberg K, **Aittokallio T** (2023)
Robust scoring of selective drug responses for patient-tailored therapy selection
Nat Protoc, 19 (1), 60-82

   Main finding: The development of a computational method for selective drug-sensitivity scoring facilitated the identification of effective and safe treatment options in precision medicine for patients with leukemia.

5. **Isaksen KT**, Galleberg R, Mastroianni MA, Rinde M, Rusten LS, Barzenje D, Ramslien F, Fluge O, Slaaen M, Meyer P, Liestol K, **Smeland EB**, **Lingjarde OC**, Holte H, **Brodtkorb M** (2023)
The Geriatric Prognostic Index: a clinical prediction model for survival of older diffuse large B-cell lymphoma patients treated with standard immunochemotherapy
Haematologica, 108 (9), 2454-2466

   Main finding: The proposed Geriatric Prognostic Index was developed and validated for older patients with diffuse large B-cell lymphoma, demonstrating superior predictive accuracy for 2-year overall survival compared to state-of-the-art approaches.

6. **Elfmark LA**, **Wenzel EM**, **Wang L**, **Pedersen NM**, **Stenmark H**, **Raiborg C** (2023)
Protrudin-mediated ER-endosome contact sites promote phagocytosis
Cell Mol Life Sci, 80 (8), 216

   Main finding: Protrudin, a protein resident in the endoplasmic reticulum (ER), mediates ER-endosome contact and facilitates the formation of phagocytic cups, playing a crucial role in phagocytosis.

7. **Hessvik NP**, **Sagini K**, **Romero S**, **Ramirez-Garrastacho M**, **Rodriguez M**, **Tutturen AEV**, **Kvalvaag A**, Stang E, **Brech A**, **Sandvig K**, **Llorente A** (2023)
siRNA screening reveals that SNAP29 contributes to exosome release
Cell Mol Life Sci, 80 (7), 177

   Main finding: A novel screening method was developed, demonstrating that depletion of proteins involved in membrane fusion, particularly SNAP29, reduced the release of small extracellular vesicles.

8. **Pust S**, **Brech A**, **Wegner CS**, **Stenmark H**, **Haglund K** (2023)
Vesicle-mediated transport of ALIX and ESCRT-III to the intercellular bridge during cytokinesis
Cell Mol Life Sci, 80 (8), 235

   Main finding: The scaffold protein ALIX and the protein complex ESCRT-III are accumulated at the midbody during mitosis and their transport is facilitated by endosomal vesicles mediated by specific motor proteins.

9. **Stonyte V**, **Mastrangelopoulou M**, Timmer R, **Lindbergsengen L**, Vietri M, Campsteijn C, **Grallert B** (2023)
The GCN2/eIF2αK stress kinase regulates PP1 to ensure mitotic fidelity
EMBO Rep, 24 (8), e56100

   Main finding: The GCN2 kinase, known for its role in protein translation during stress, was found to be a regulator of mitosis by phosphorylating the key factor PP1, suggesting anti-cancer effects of GCN2 inhibitors.

10. **Høland M**, **Berg KCG**, **Eilertsen IA**, Bjerkehagen B, **Kolberg M**, Boye K, **Lingjærde OC**, Guren TK, Mandahl N, van den Berg E, Palmerini E, **Smeland S**, Picci P, Mertens F, **Sveen A**, **Lothe RA** (2023)
Transcriptomic subtyping of malignant peripheral nerve sheath tumours highlights immune signatures, genomic profiles, patient survival and therapeutic targets
EBioMedicine, 97, 104829

    Main finding: Approximately half of malignant peripheral nerve sheath tumours belong to a subtype associated with an aggressive disease, expressing several potential therapeutic targets, which could open for molecularly-guided intervention trials.

11. Lachota M, Zielniok K, Palacios D, **Kanaya M**, Peena L, **Hoel HJ**, **Wiiger MT**, **Kveberg L**, Hautz W, Zagożdżon R, **Malmberg KJ** (2023)
Mapping the chemotactic landscape in NK cells reveals subset-specific synergistic migratory responses to dual chemokine receptor ligation
EBioMedicine, 96, 104811

    Main finding: Chemokine stimulation can elicit a synergistic response in natural killer (NK) cells which, combined with the lack of naturally occurring pairs of chemokines-chemokine receptors in human cancers, may provide a basis for engineering next-generation NK cell therapies against malignancies.

12. **Eek Mariampillai A**, **Hauge S**, **Kongsrud K**, **Syljuåsen RG** (2023)
Immunogenic cell death after combined treatment with radiation and ATR inhibitors is dually regulated by apoptotic caspases
Front Immunol, 14, 1138920

    Main finding: ATR kinase inhibition increased the presentation of immunogenic cell death markers in irradiated human cancer cell lines, and this presentation was regulated by caspase activity.

13. **Longva AS, Berg K, Weyergang A** (2023)
Light-enhanced $VEGF_{121}$/rGel induce immunogenic cell death and increase the antitumor activity of αCTLA4 treatment
Front Immunol, 14, 1278000

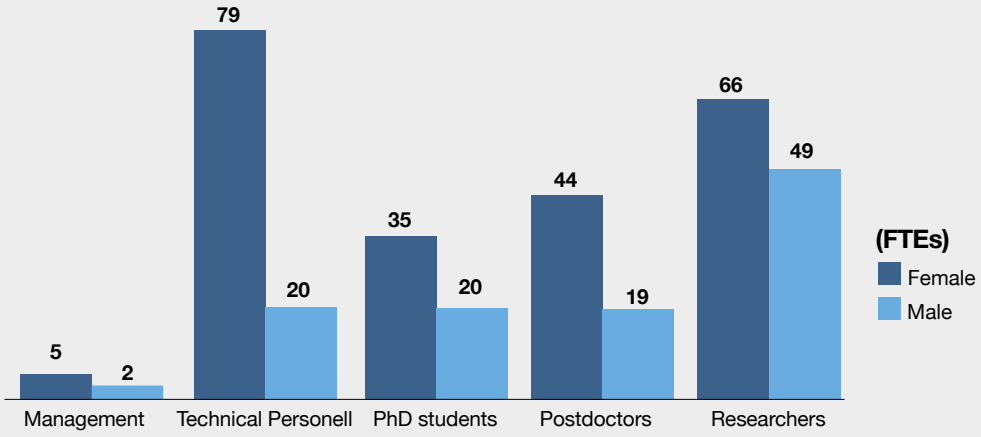
    Main finding: Immune-checkpoint inhibition may be enhanced by photochemical internalization in combination with the vascular targeting toxin VEGF121/rGel, characterized by a rapid CD8+ mediated tumor eradication in tested mouse tumors.

14. **Nakken S**, Gundersen S, Bernal FLM, Polychronopoulos D, **Hovig E**, **Wesche J** (2023)
Comprehensive interrogation of gene lists from genome-scale cancer screens with OncoEnrichR
Int J Cancer, 153 (10), 1819-1828

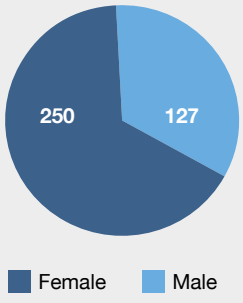
    Main finding: The developed OncoEnrichR bioinformatics tool simplified and enhanced the interpretation of gene lists from cancer screening experiments by also including diverse cancer-related information such as literature-supported proto-oncogene and tumor suppressor gene annotations and target druggability data.

THE PEOPLE

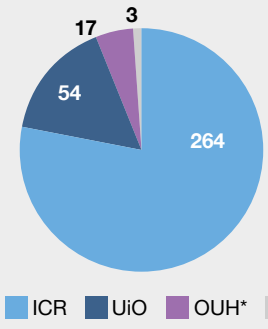
Employees



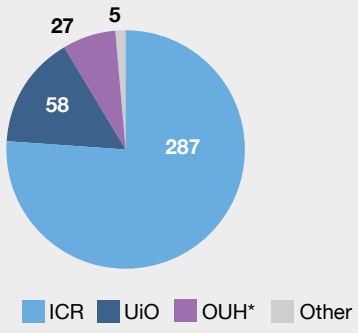
Employees by Gender
(total 377)



FTEs by Employer
(total 339)



Employed by
(total 377)



*other than ICR

Prizes and Honors 2023

- King Olav V's Prize for Cancer Research to Åslaug Helland
- Eric K. Fernström's Nordic Prize in Medicine to Harald Stenmark
- University of Oslo Innovation Prize to Kjetil Taskén
- International Photodynamic Association Lifetime Achievement Award to Kristian Berg
- Oslo University Hospital Early Career Award to Kushtrim Kryeziu
- Vaccibody Innovation Award by SPARK Norway to Anette Weyergang
- Ragnar Mørk's Legacy's Prize for excellent cancer research to Mev Dominguez Valentin
- Institute for Cancer Research "Researcher of the year 2023" to Sigrid S. Skånland
- Finsen Medal by International Union of Photobiology to Kristian Berg
- Young Investigator Prize from Oncology Forum to Eirini Giannakopolou
- International Photodynamic Association Basic PDT Research Excellence Award to Anette Weyergang
- The Norwegian Society of Immunology Research Prize 2023 was shared between A Røssevold, JA Kyte a.o. (Nat Medicine 2022 paper), and E. Giannakopolou and the Olweus team (Nat Cancer 2023 publication)
- Institute for Cancer Research "Employee of the year 2023" to Jorge Gomes
- Oslo University Hospital "Excellent article" prize to Yanping Yin and Sigrid Skånland (Clin Cancer Res, 28, 4444-4455)

Completed PhDs 2023

Lilli Theres Eilertsen Bay
Radiation Biology
Interplay between the transcription machinery and the responses to DNA damage and replication stress

Janna Berg
Cancer Genetics
Pulmonary function and serum biomarkers in patients with non-small cell lung cancer, radiation pneumonitis and chronic obstructive lung disease

Mari Bogaard
*Molecular Oncology/Pathology**
On the hunt for improved biomarkers in primary prostate cancer – combining morphological features and molecular changes

Inger Johanne Zwicky Eide
Cancer Genetics
Novel EGFR-directed therapy - a clinical study

Espen Basmo Ellingsen
Tumor Biology
Telomerase-based therapeutic vaccination and checkpoint inhibition: Characterization of the induced immune response and impact on the tumor microenvironment

Ingrid Jenny Guldvik
Tumor Biology
LRG1 as a non-invasive biomarker for improved precision in prostate cancer assessment

Tobias Hauge
*Molecular Oncology/GI-Surgery**
Esophageal Cancer and Barrett's Esophagus Targeted molecular profiling and long-term outcome following minimally invasive esophagectomy and endoscopic treatment

Eirik Høye
Tumor Biology
Computational Appcoraches in Colorectal Cancer Metastasis

Kathrine Thuestad Isaksen
Cancer Immunology
Age-related and molecular predictive markers in diffuse large B-cell lymphoma

Inger Marie Bowitz Lothe
Cancer Genetics
Pancreatic and Periampullary Adenocarcinomas: A Clinical, Hisotpathological and Molecular Study

Adrian Eek Mariampillai
Radiation Biology
Assessment of immunogenic signalling from cancer cells after irradiation and ATR inhibition

Seyed Hossein Moosavi
Molecular Oncology
Clinical implications of transcriptomic and pharmacological tumor heterogeneity of metastatic colorectal cancers

Lisa Svartdal Norman
Tumor Biology
HER2-Positive Breast Cancer and Drug Response in Pre-Clinical Models

Unn Beate Salberg
Radiation Biology
Biopsy- and imaging-based biomarkers in prostate cancer

Vilde Yuli Stenberg
Radiation Biology
A novel 212Pb-labelled PSMA-targeting ligand for alpha therapy of metastatic prostate cancer

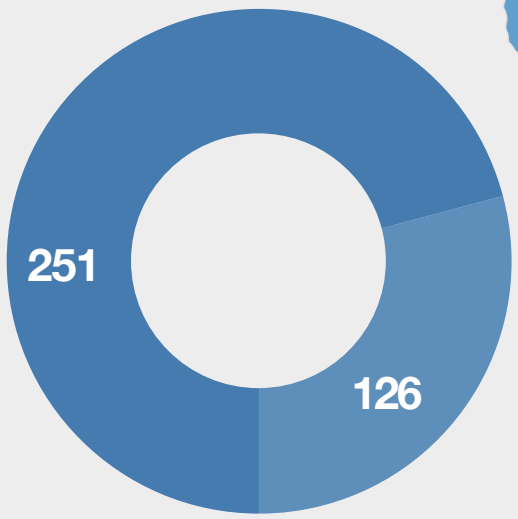
**Co-hosted*

THE PEOPLE

International Staff Distribution

126
people in total from outside Norway

37
nations are represented



- Norwegian: **251 (67%)***
- International: **126 (33%)**

*Including naturalised foreigners

01
Countries represented by one person
Bosnia and Herzegovina
Colombia
Croatia
Czech Republic
Egypt
Latvia
Morocco
Peru
Portugal
Serbia
Slovakia
South Africa
Switzerland

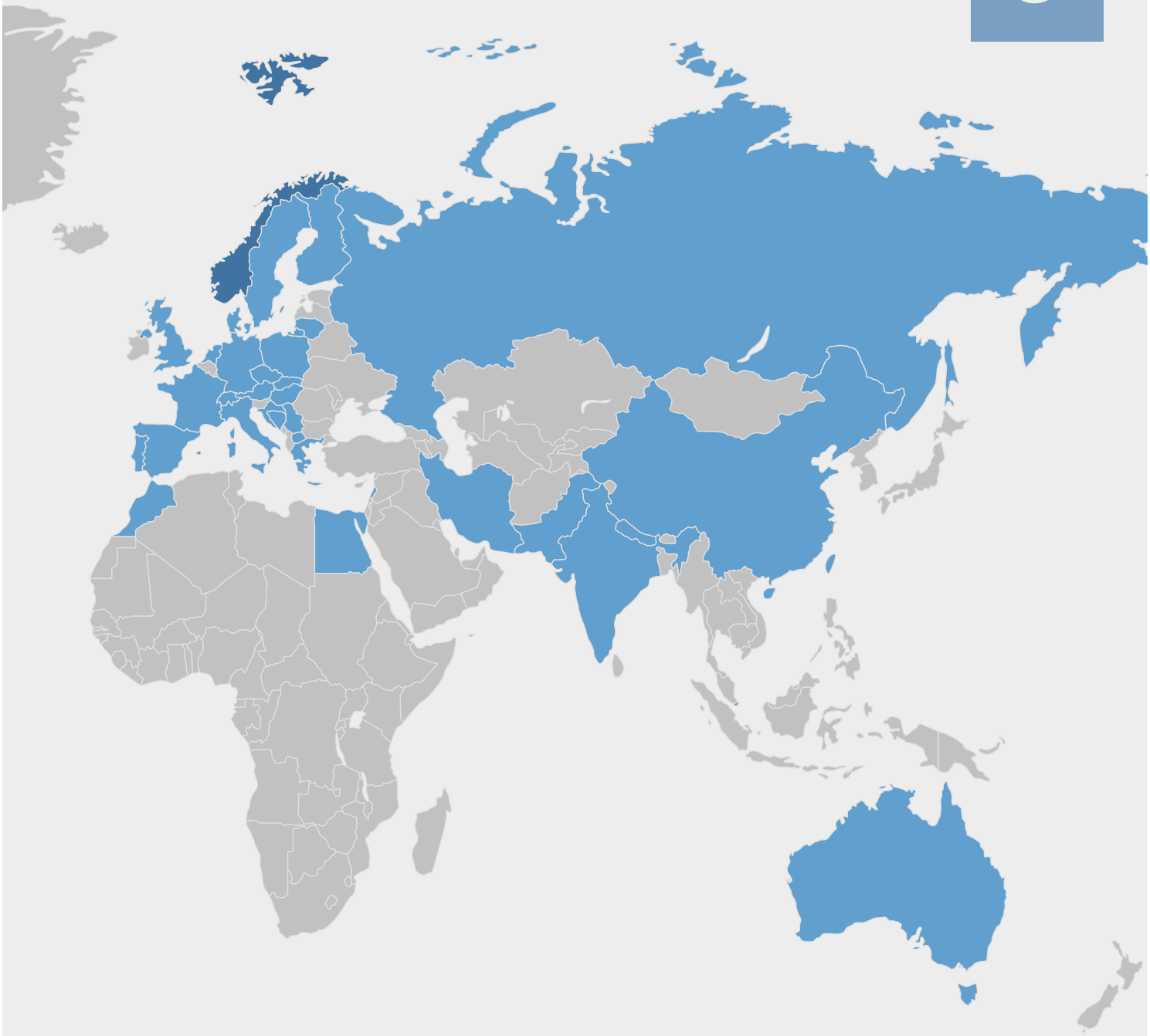
02
People
Chile
Denmark
Lebanon
Nepal
Netherlands
Pakistan
Poland
Russia

03
People
Austria
Finland
USA

04
People
Australia
Great Britain
Hungary
Iran

05
People
Greece

06
People
France
Lithuania



07
People
Spain

08
People
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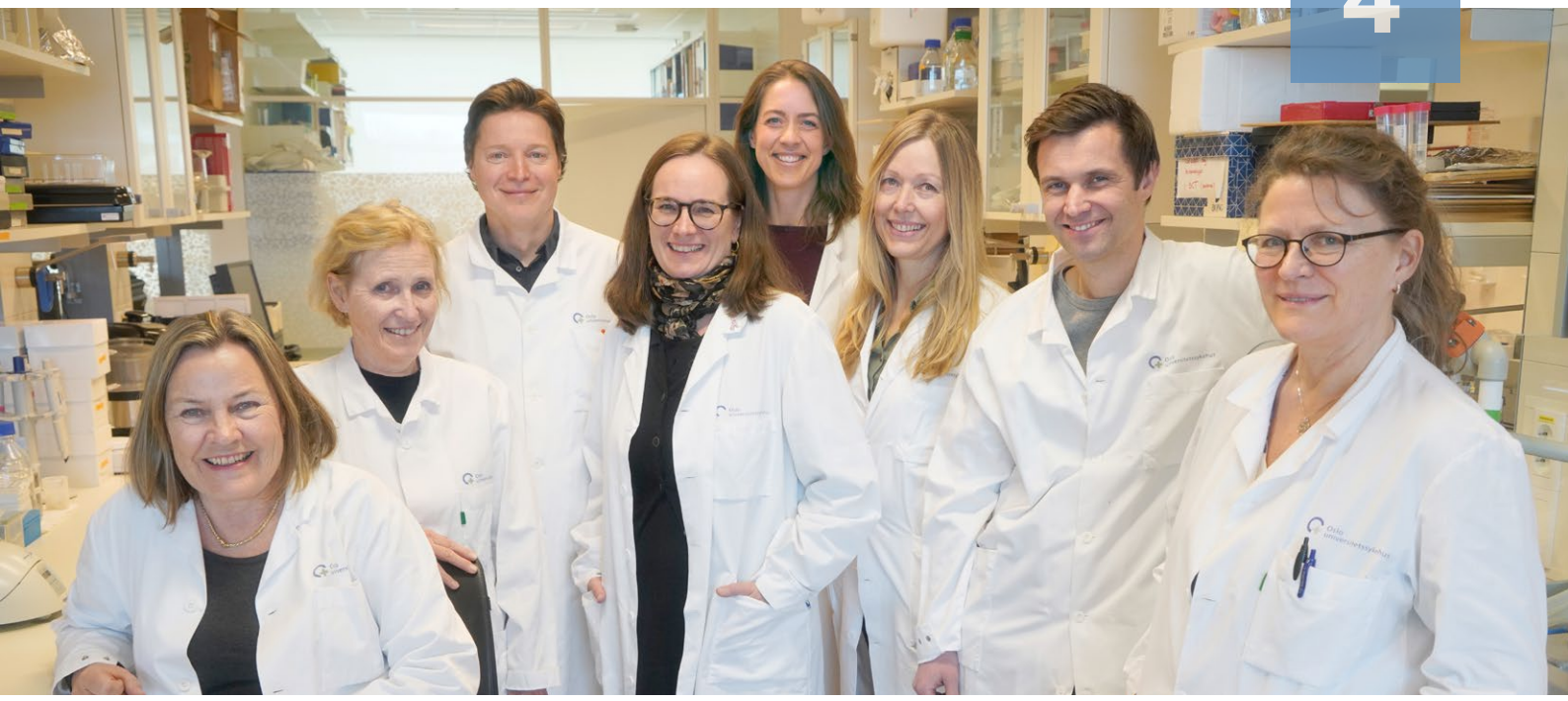
People
China
Germany

DEPARTMENT OF CANCER GENETICS



Gry Aarum Geitvik, Elin Kure, Tero Aittokallio, Hege E. G. Russnes, Vilde Drageset Haakensen, Therese Sørlie, Thomas Fleischer, Åslaug Helland

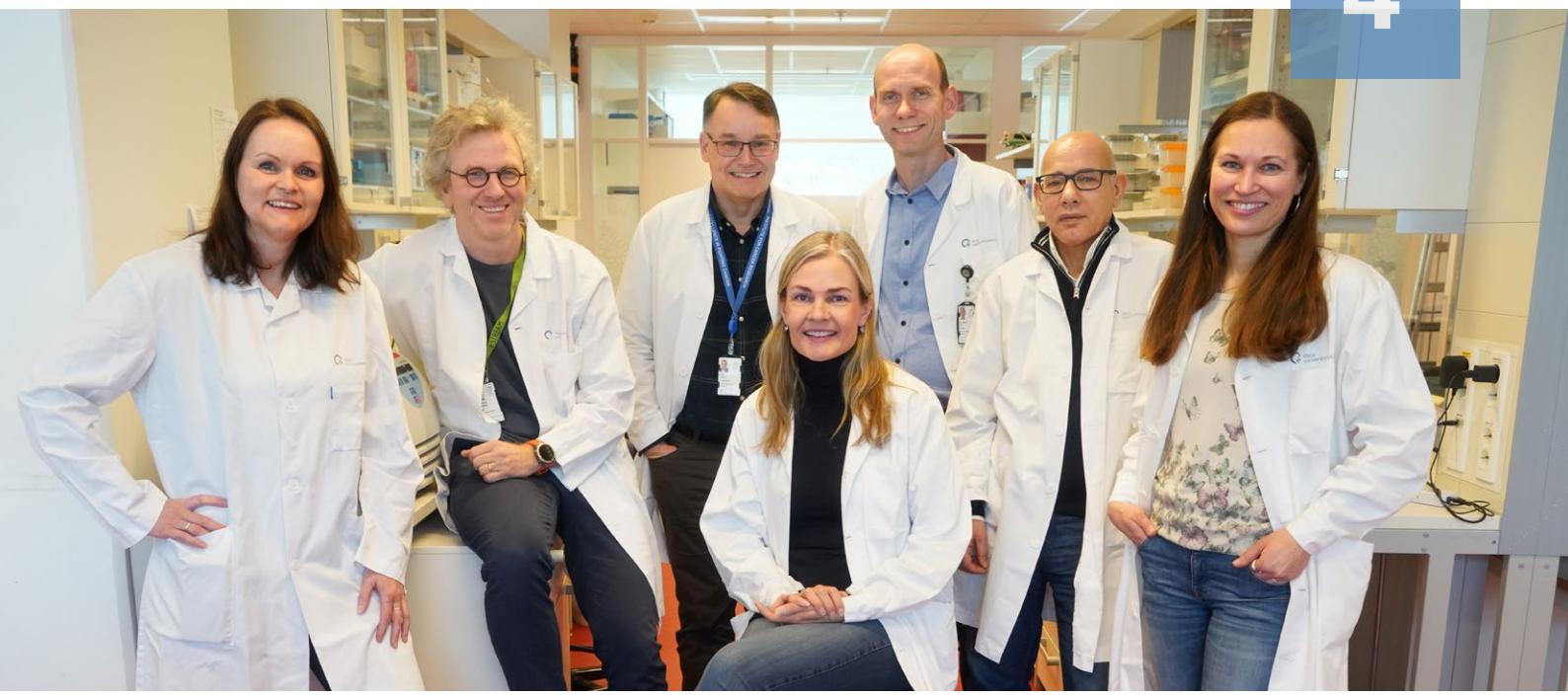
Head of Department: Therese Sørlie / Employees: 55

Breast Tumor Evolution	Computational Systems Medicine in Cancer	Lab Technology	Translational Studies on Solid Tumors	Molecular Biology of Breast Cancer
Therese Sørlie	Tero Aittokallio	Gry Aarum Geitvik	Åslaug Helland	Hege Russnes
	Epigenomics of Breast Cancer Thomas Fleischer		**Therapy Prediction in Lung Cancer** Vilde Drageset Haakensen **Translational Research in Pancreatic and Colorectal Cancers** Elin Kure	

- We published 33 scientific articles in 2023
- King Olav V's Cancer Research Award to Å. Helland
- Three PhD and three Master degrees awarded
- Six new research grants obtained (Helland, Aittokallio, Rye, Rakaee, Sørlie)
- By the end of 2023, >1500 patients have been included in IMPRESS-Norway
- First survival data from the NIPU-trial presented as an oral late-breaking abstract at ESMO 2023
- First data from the EMIT-EBC trial presented as a poster at ESMO Breast Cancer 2023
- Results from G-definer presented with a poster at ASCO 2023
- PCM4EU started up, represented with two WP-leaders from Cancer Genetics
- PRIME-ROSE was initiated in the of summer 2023, with WP-leader from the department and participation from IMPRESS-Norway
- We biobanked > 12000 biological samples from cancer patients (tissue, PMBC, single cells)

DEPARTMENT OF CANCER IMMUNOLOGY

"Our goal is to improve cancer diagnostics and therapy through cutting edge research on tumor immunology and lymphocyte biology"



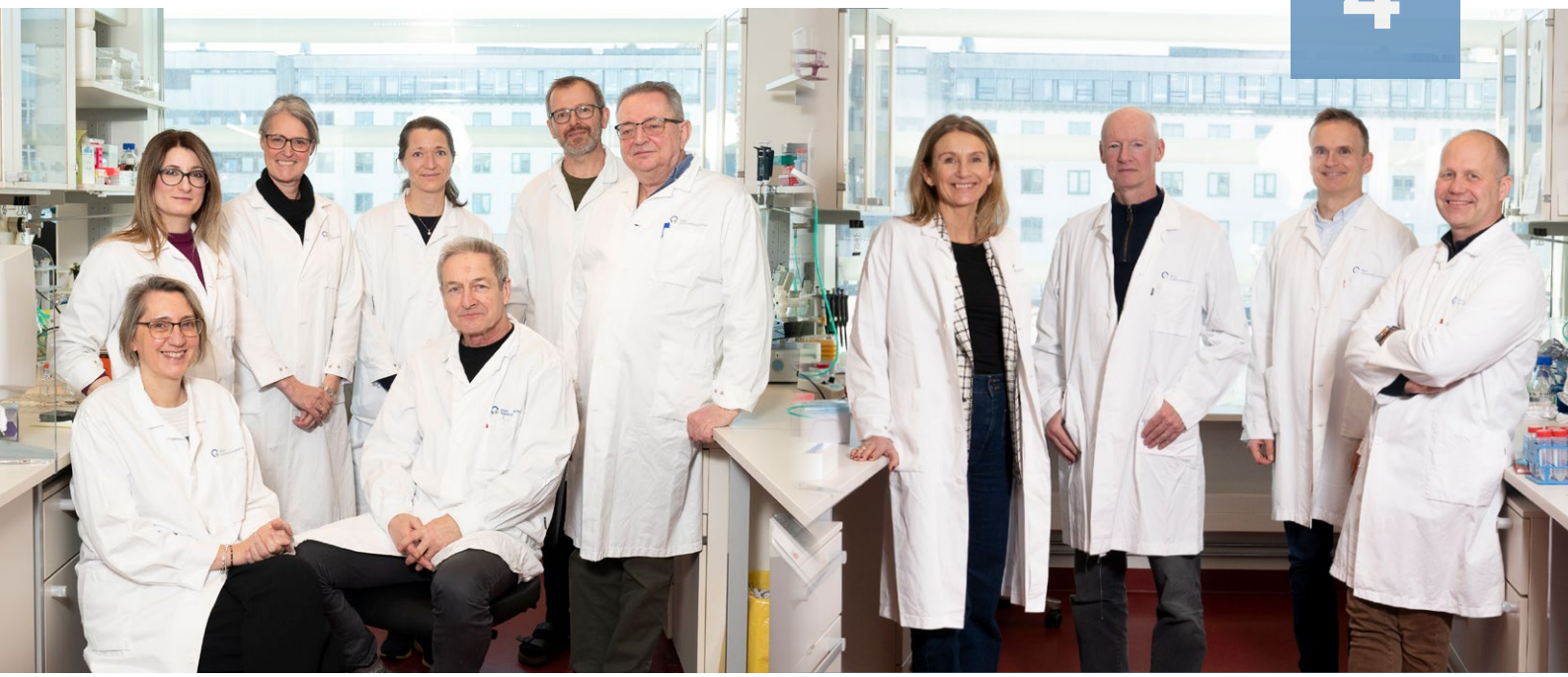
June H. Myklebust, Karl-Johan Malmberg, Kjetil Taskén, Johanna Olweus, Jon Amund Kyte, Mouldy Sioud, Sigrid Skånland

Head of Department: Johanna Olweus / Employees: 70

Experimental Immunotherapy Johanna Olweus	**Immuno-therapy against solid cancers** Jon Amund Kyte	**NK Cell Biology and Cell Therapy** Karl-Johan Malmberg	**Lymphoma Biology** June H. Myklebust	**Immuno-modulation and Targeted Therapies** Mouldy Sioud	**Cell Signaling and Immune Regulation** Kjetil Taskén
					Functional Precision Medicine for Haematological Cancers Sigrid Skånland

- Malmberg (Co-director), Olweus (Co-director) and Myklebust (Partner) launched their new Centre of Excellence: Precision Immunotherapy Alliance, PRIMA.
- Malmberg group organized the 20th International Symposium of the Society for Natural Immunity with 465 delegates at Holmenkollen Park Hotel.
- K. Taskén awarded the Innovation prize 2023 by the University of Oslo for his work to establish a national initiative for precision medicine in cancer.
- E. Giannakopoulou first and Olweus senior author (total 13 co-authors from the group) on Nat Cancer article: A TCR that mediates elimination of acute myeloid leukemia in vivo by targeting of a shared driver mutation. Commentary in Nat Cancer.
- CB. Steen (Myklebust group) shared first author on Nat Biotechnol article, describing CytoSPACE for single-cell deconvolution of spatial expression profiles.
- "Scientist of the Year" awarded by the Institute for Cancer Research to Sigrid Skånland, "Young scientist prize" awarded by the Norwegian Oncology Forum to Eirini Giannakopolou, and "Young Talent" grant awarded to Youxian Li from the Research Council of Norway.
- The Norwegian Society of Immunology Research Prize 2023 was shared between A Røssevold, JA Kyte and the study team for their publication in Nat Medicine Dec 2022 (ALICE-trial), and E. Giannakopolou and the Olweus team for their Nat Cancer 2023 publication (described above).
- The Skånland/Taskén group optimized and validated a drug sensitivity screening method for CLL and this method is now used in a cohort in the IMPRESS-Norway trial (two publications in Cell Death Different. 2023).
- Scientists at DCI published 33 articles with 19 as first/senior author with a median impact factor of 6.6.

DEPARTMENT OF MOLECULAR CELL BIOLOGY



Project Leaders: Alicia Llorente, Marina Vietri, Camilla Raiborg, Kaisa Haglund, Andreas Brech, Tore-Geir Iversen, Antoni Wiedlocha. Absent: Alf Håkon Lystad

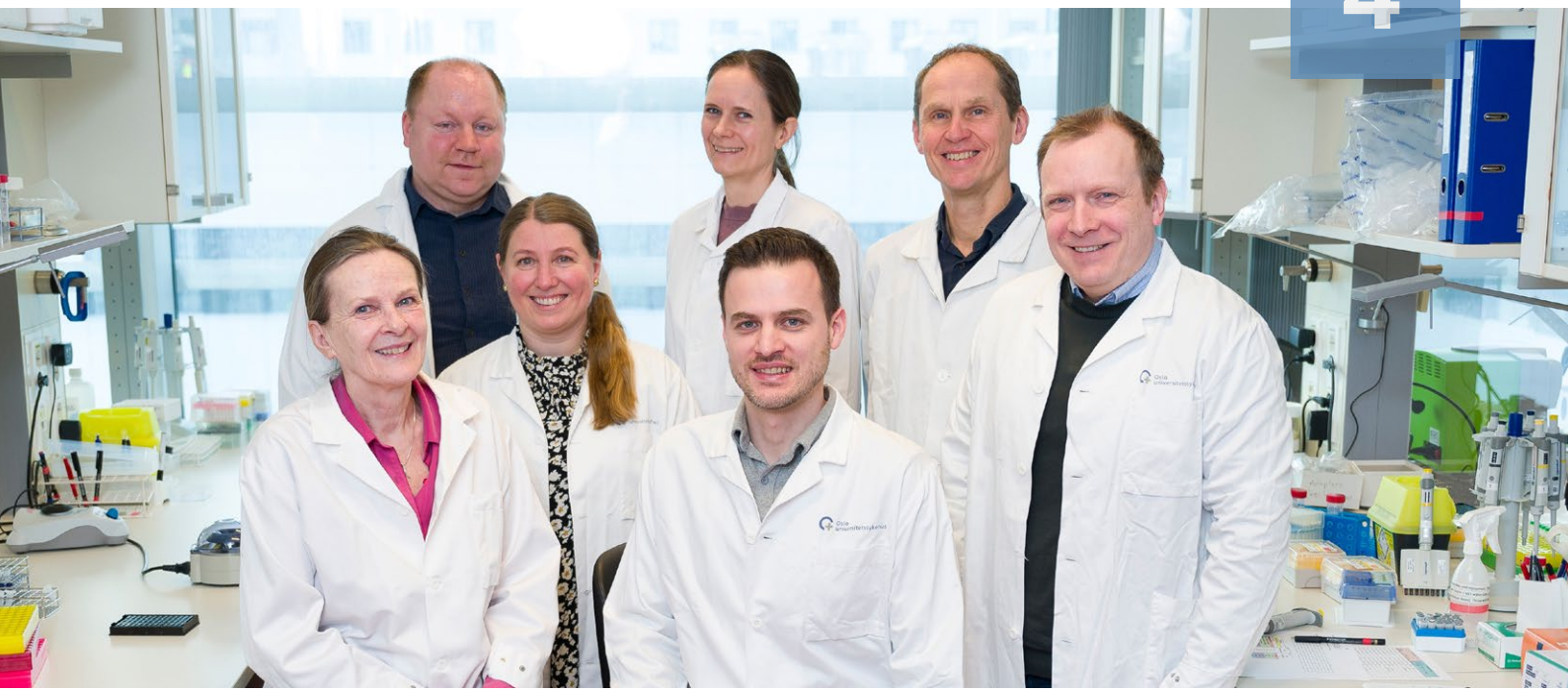
Group Leaders: Anne Simonsen, Harald Stenmark, Jorrit Enserink, Tor Erik Rusten

Head of Department: Harald A. Stenmark / Employees: 88

Cellular Membrane Dynamics Harald A. Stenmark	**Cancer Molecular Medicine** Jorrit Enserink	**Tumor-Host Biology** Tor Erik Rusten	**Autophagy** Anne Simonsen
Unit of Cellular Electron Microscopy Andreas Brech			
Cytokinesis in Development and Carcinogenesis Kaisa Haglund			
Nanoparticles in Biomedicine: In Vitro Studies Tore-Geir Iversen			
Exosomes and Prostate Cancer Alicia Martinez Llorente			
Autophagy and Related Pathways Alf Håkon Lystad			
Protein Dynamics in Tumor Suppressor Pathways Camilla Raiborg			
Membrane Dynamics in Tumorigenesis Marina Vietri			
Protein Internalisation and Signaling Antoni Wiedlocha			

- MCB welcomes the department's new group leader, Anne Simonsen, an internationally leading expert on autophagy, who started in June 2023.
- MCB scientists published 43 papers in 2023, 21 of these as first or last authors. The mean and median impact factors of published articles were 9.3.
- MCB scientists were first/last authors of papers published in leading journals such as Nature Communications, PNAS, Cell Research, EMBO Journal, and Autophagy.
- Harald Stenmark received a Researcher Grant and Marina Vietri a Pioneer Grant from the Cancer Society.
- Anne Simonsen and Harald Stenmark received Open Project Grants from Helse Sør-Øst.
- Maja Radulovic received a Young Talents Grant from the Research Council.
- Harald Stenmark received Eric K. Fernström's Nordic Prize in Medicine.

DEPARTMENT OF MOLECULAR ONCOLOGY



Ragnhild A. Lothe, Edward Leithe, Guro E. Lind, Anita Sveen, Kushtrim Kryeziu, Rolf I. Skotheim, Bjarne Johannessen

Head of Department: Ragnhild A. Lothe / Employees: 37

Genetics Ragnhild A. Lothe

Functional Oncology
Kushtrim Kryeziu

Cell Signalling
Edward Leithe

Computational Oncology
Anita Sveen

Epigenetics Guro E. Lind

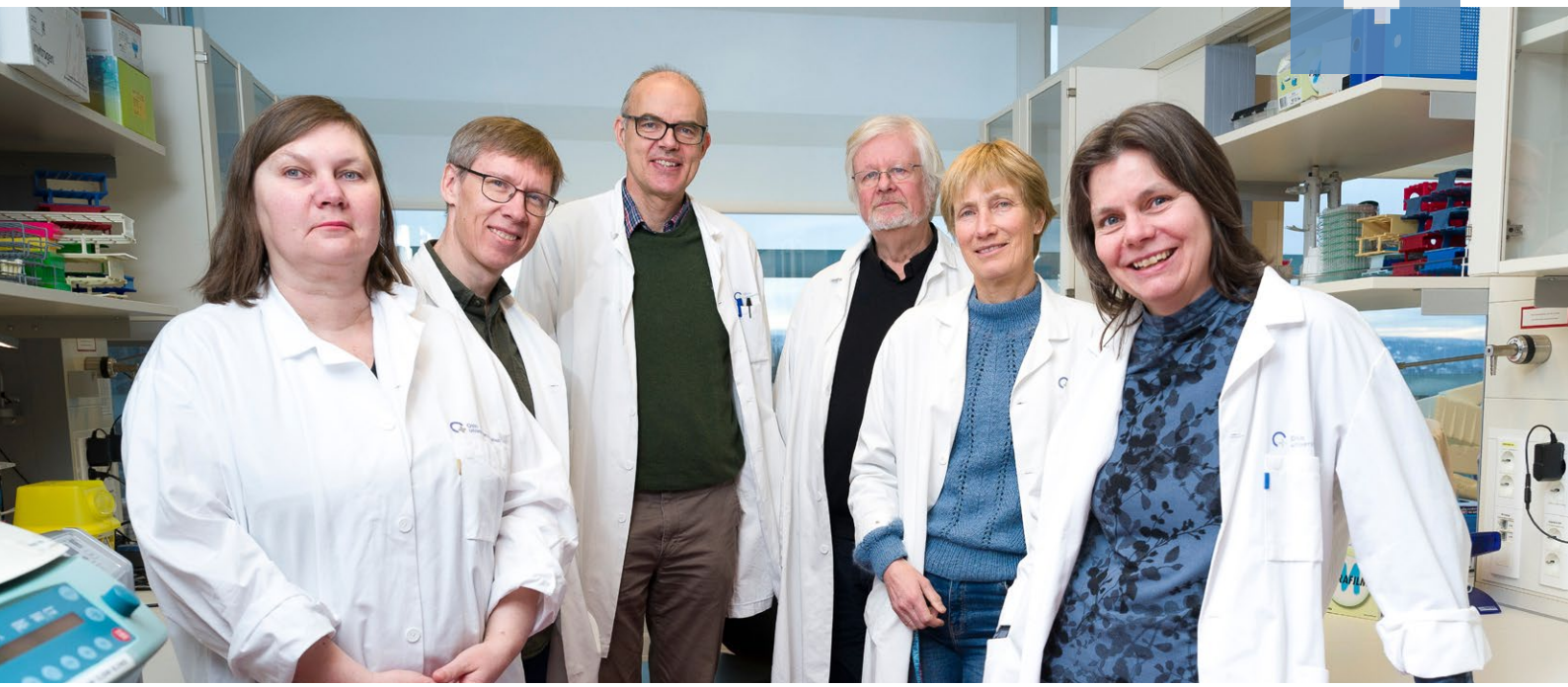
Genome Biology Rolf I. Skotheim

Cancer Informatics
Bjarne Johannessen

- We run EVIDENT (ex vivo drug sensitivity testing), a prospective intervention study of tumor organoid-guided treatment of metastatic colorectal cancer. > 50 patients have been included and pre-screened by drug sensitivity testing of personal tumor organoid models.
- We finalized patient inclusion in a national surveillance study of bladder cancer recurrence (n=600 patients). Each patient is monitored with urine samples and the BladMetrix methylation test for 2 years (total n= 7000 samples).
- Kushtrim Kryeziu received the Early Career Award from Oslo University Hospital.
- Five department members successfully defended their academic degrees (3 PhD and 2 MSc).
- Lothe was member of the organizing committee of the EACR-OECI Molecular Pathology Approach to Cancer, Bergamo, Italy.
- Invited presentations at the EACR-OECI Molecular Pathology Approach to Cancer (Bergamo, ITA), Nordic Precision Cancer Medicine Symposium (Oslo), NextGen Omics (Oxford, UK), Danish Comprehensive Cancer Centre (Odense, DEN), and key note speaker at International Colloquium on Gap Junctions and Cancer (Sao Paulo, BRA).
- We published nine research articles (eight with first and last authors) indexed on PubMed, including a European multicenter study of the rare cancer type malignant peripheral nerve sheath tumor (Høland et al., eBioMedicine, 2023). We found that half belong to an “immune deficient” transcriptomic subtype associated with an aggressive disease course and expression of several potential therapeutic targets.

DEPARTMENT OF RADIATION BIOLOGY

Our vision is to understand responses to ionizing and non-ionizing radiation on the molecular, cellular, and physiological levels, and utilize this knowledge to improve cancer outcomes with new biomarkers, therapies, and technologies.



Asta Juzeniene, Eirik Malinen, Pål Kristian Selbo, Kristian Berg, Heidi Lyng, Randi Syljuåsen.
Absent: Theodossis A. Theodossiou, Beata Grallert, Anette Weyergang

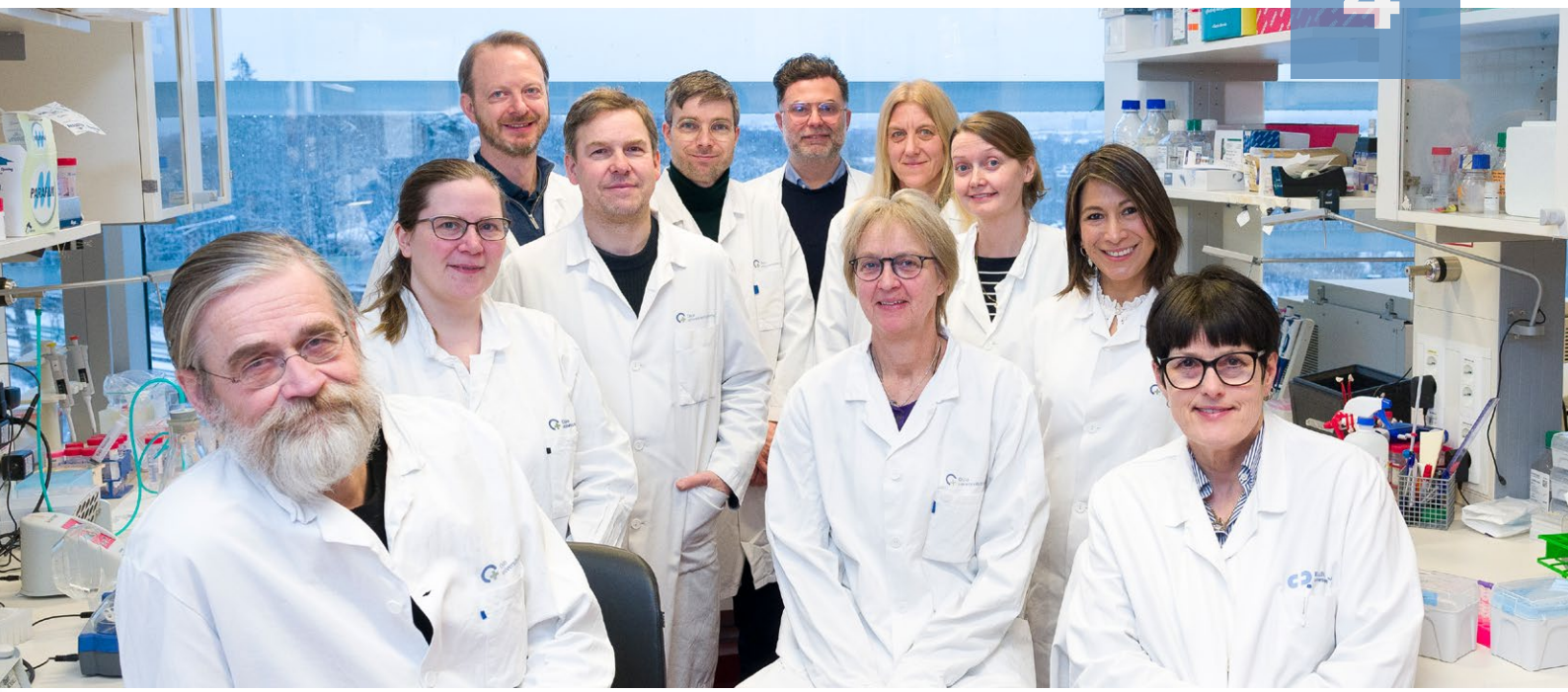
Head of Department: Eirik Malinen / Employees: 50

Preclinical and translational proton therapy Eirik Malinen	**Photochemical Internalization** Kristian Berg	**Targeted Alpha Therapy** Asta Juzeniene	**Clinical Radiation Biology** Heidi Lyng	**Radiation Biology and DNA Damage Signaling** Randi Syljuåsen
Protonics Theodossis A. Theodossiou	**Light-Controlled Delivery of Cancer Immunotherapeutics** Pål Kristian Selbo **Recombinant Light Activated Therapeutics** Anette Weyergang			**Regulation of Translation in Cell Cycle and Stress** Beata Grallert

- Eirik Malinen was appointed as the new Head of the Department with a focus on experimental proton therapy and started in August 2023.
- 4 PhDs and 9 MScs supervised by group- or project leaders at our department successfully defended their thesis.
- Two grants from the Norwegian Cancer Society (Grallert, Lyng), two postdoc grants from South-Eastern Norway Regional Health Authority (Lyng, Malinen), and one infrastructure grant from Simon Fougner Hartmanns Familiefond (Malinen and Lyng).
- Establishment of the company Rab Diagnostics, aiming to develop a technological platform to predict the response of targeted cancer therapy (Weyergang).
- Partner in EIC pathfinder project NuCapCure on Development of innovative proton and neutron therapies with high cancer specificity (Theodossiou).
- Arrangement of the International Wolfsberg Meeting on Molecular Radiation Biology/Oncology in Oslo (Syljuåsen and Lyng).
- Pål K Selbo elected as President-elect of the European Society for Photobiology.
- The Vaccibody Innovation Award and the IPA Basic PDT Research Excellence Award to Anette Weyergang and the IPA Lifetime Achievement Award to Kristian Berg.

DEPARTMENT OF TUMOR BIOLOGY

"Preclinical and clinical efforts towards precision oncology"



Eivind Hovig, Karianne Giller Fleten, Nikolai Engedal, Jørgen Wesche, Mads H. Haugen, Alfonso Urbanucci, Gunhild M. Mælandsmo, Lina Prasmickaite, Ellen M. Haugsten, Mev Dominguez-Valentin, Kjersti Flatmark. Absent: Kristin A. Taskén, Leonardo A. Meza-Zepeda

Head of Department Gunhild M. Mælandsmo / Employees: 54

Metastasis Biology and Experimental Therapeutics
Gunhild M. Mælandsmo

Molecular Precision Medicine in Breast Cancer
Mads H. Haugen

Tumor-Stroma Interactions in Metastasis and Therapy
Lina Prasmickaite

Urological Molecular Biology
Kristin A. Taskén

Translational Cancer Therapy
Kjersti Flatmark

Experimental Treatment of Peritoneal Metastasis
Karianne Giller Fleten

Computational Cancer Genomics
Eivind Hovig

Inherited and Familial Cancer
Mev Dominguez-Valentin *2024

Autophagy in Cancer
Nikolai Engedal

Genomic Regulation for Precision Cancer Medicine
Alfonso Urbanucci

Molecular Biology of Sarcomas
Jørgen Wesche

Cancer Cell Migration, Invasion and Metastasis
Ellen M. Haugsten

Translational Genomics
Leonardo A. Meza-Zepeda

- Four project leaders obtained major funding from the Cancer Society and the Regional Health Authority for South- Eastern Norway;
  - Single-cell sequencing in prostate cancer (to Urbanucci)
  - Autophagy in prostate cancer (to Engedal)
  - Spatial proteomics in breast cancer (to Haugen)
  - Improving stratification and treatment of gastrointestinal stromal tumors (to Meza-Zepeda)
- Clinical feasibility study to evaluate beta-blocker use in prostate cancer surgery: inclusion completed.
- New collaborative EU-funded project on peritoneal metastases funded.
- Tumor biology scientists published 40 papers of which half as first or last author, 4 PhDs and 3 MSc degrees.

DEPARTMENT OF CORE FACILITIES

Ellen Skarpen, Idun Dale Rein, Leonardo A. Meza-Zepeda, Susanne Lorenz

Head of Department: Leonardo A. Meza-Zepeda / Employees: 16

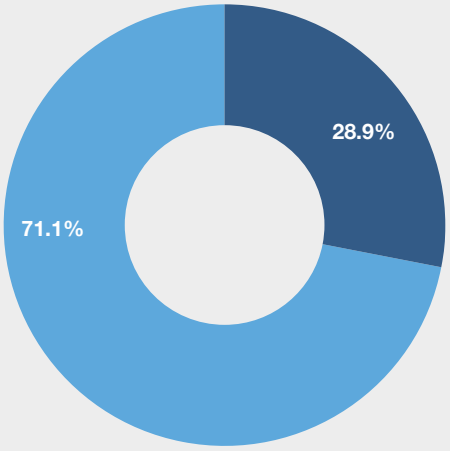
Preclinical Proton Therapy and Imaging Tord Hompland (from March 2024)	**Genomics and Bioinformatics** Susanne Lorenz	**Flow Cytometry** Idun Dale Rein	**Advanced Light and Electron Microscopies** Ellen Skarpen

- The Advanced Light Microscopy Facility has successfully implemented a new spinning disk microscope for gentle 3D imaging.
- The Advanced Electron Microscopy Facility has implemented new software packages for high-throughput image acquisition and improved 3D modelling.
- The Bioinformatics Core Facility has built competence and services for proteomics data analysis.
- The Flow Cytometry Facility has implemented Full-spectrum Flow Cytometry with two new instruments: a 5-laser Analyzer and a 3-laser Cell Sorter, both Cytek Aurora.
- The Genomics Facility has installed new Hamilton NGS Star liquid handling robots, enabling higher throughput for genomics and transcriptomics workflows.
- The Genomics Facility has expanded single-cell and spatial services to perform multi-omics analysis, integrating different levels of epigenomic, transcriptomics and protein data.
- A new Unit for Preclinical Proton Therapy and Imaging was established at the Department.

THE FUNDING

In 2023, institute researchers received more than 250 million NOK in incoming new grants starting 2024. This includes:

- Nine new grants from the Cancer Society
- Eleven new research grants and two innovation grants from the Regional Health Authority for South Eastern Norway
- Young Talent grants from the Research Council of Norway to Youxian Li and Maja Radulovic
- A Cancer Grand Challenge grant (CRUK/NIH) to the MATCHMAKERS project consortium to decipher the T-cell receptor cancer-recognition code (Norwegian PI Johanna Olweus)
- Major funding from the Swedish Cancer Society to Kalle Malmberg to carry out a Phase I/II cell therapy trial with adaptive NK cells against acute myeloid leukemia (AML) as a collaboration between OUH (including ACT) and Karolinska University Hospital.
- European Innovation Council (EIC) Pathfinder project NuCapCure on Development of innovative proton and neutron therapies with high cancer specificity with Theo Theodossiou as PI.

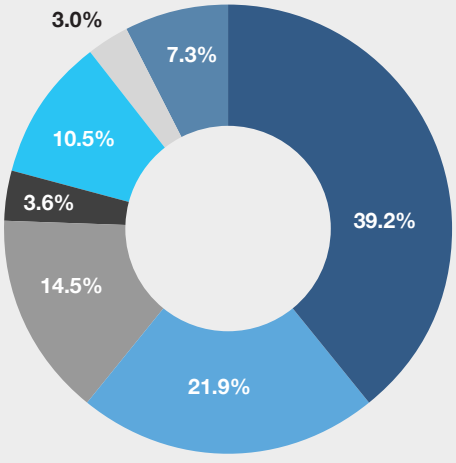


Funding in 2023

Percent

Actual Institute expenditure for 2023
by internal and external funding sources
(total 388,7 MNOK = approx. 34,1 M€)

- Internal funding
- External funding



External funding by source

Percent

Sources of external competitive funding for 2023, based
on actual expenditure (total 276,3 MNOK= approx. 24,2 M€)

- South-Eastern Norway Regional Health Authority
- The Research Council of Norway
- The Norwegian Cancer Society
- University of Oslo
- EU
- Other international sources
- Other private sources

THE CENTRES

MATRIX – Norwegian Centre for Clinical Cancer Research

MATRIX
NORWEGIAN CENTRE FOR CLINICAL CANCER RESEARCH

Headed by Director Åslaug Helland, Co-Director Stein Kaasa
Hosted by OUH, Division of Cancer Medicine / ICR

- MATRIX has an overall ambition to extend the lives and improve the quality of life of Norwegian patients with hard-to-treat cancers, and the Centre has altogether 17 partners and study sites across Norway and the first six MATRIX-sponsored trials have started/are starting.
- MATRIX develops next-generation precision diagnostics and treatment as well as new, digital cancer care tools that secure treatment and follow-up tailored to the individual patient. The Centre is intimately linked to activities at the ICR.
- In September, MATRIX organized the first international Nordic Precision Cancer Medicine Symposium with 260 participants and 20 world-leading, international speakers together with ACTA Oncologica and Oslo University Hospital.
- MATRIX and partner OsloMet have established a new master course: Introduction to Clinical Studies for Healthcare Personnel (MAVIT5800).
- MATRIX, in addition to a broad national network, has many international collaborations and is heavily involved in three ongoing EU projects: MyPath, PCM4EU and PRIME-ROSE.

Centre for Clinical Treatment Research

Centre for Cancer Cell Reprogramming (CanCell)

Headed by Director Harald Stenmark, Co-Director Anne Simonsen.
Hosted by Institute of Clinical Medicine, UiO

- New mechanism for detection of sphingomyelin exposure on membranes in non-canonical autophagy (Kaur et al., *EMBO Journal*).
- New web-based tool for identification of cancer-relevant proteins and genes, oncoEnrichR (Nakken et al., *International Journal of Cancer*).
- Identification of ATPase-regulated autophagosome formation (Nähse et al., *Nature Communications*).
- New tool for design and analyses of drug combinations, screenwerk (Hanes et al., *Bioinformatics*).
- Identification of simaphagy – autophagy of hypersignalling endosomes (Migliano et al., *Autophagy*).

THE CENTRES

Precision Immunotherapy Alliance (PRIMA)

Precision Immunotherapy Alliance

Headed by K.J. Malmberg and J. Olweus.
Hosted by Institute of Clinical Medicine, UiO

- Hosted an inaugural retreat and established interdisciplinary Task Forces (Target Discovery, Spatial Biology, CRISPR Editing) with members from various teams to tackle key challenges in cancer research through collaborative efforts.
- The Olweus team published an article in Nature Cancer on the discovery of a TCR that eliminates acute myeloid leukemia in vivo. Commentary in Nature Cancer. First author Eirini Giannakopolou awarded: “Young Scientist Prize” by the Norwegian Oncology Forum and the article prize 2023 by the Norwegian Society for Immunology.
- Organized monthly breakfast meetings, sponsored keynote address by Professor Lewis Lanier, and hosted Professor Dr. Özlem Türeci, presenting advances in CAR-T cell therapy and mRNA vaccine technology.

Center for Advanced Cell and Gene Therapy (ACT)

Headed by Anna Pasetto.
Hosted by Section for Cell Therapy, Dept. of Oncology, OUH, Co-hosted by the ICR

- Completed hiring of ACT staff and acquisition of key equipment
- Completed administrative and financial set-up and launched a transparent review and fee-for-service model
- Supported 3 academic projects in pre-GMP process development
- Supported 4 academic projects in GMP manufacturing and tech transfer for 1 commercial project
- Formulated a roadmap for the creation of an extended national infrastructure: ATMP Norway and connected with major ATMP initiatives across the Nordic region

"Bringing best in class cell therapy to Norwegian patients"

K.G. Jebsen Centre for B-cell Malignancies

Headed by Ludvig A. Munthe and June H. Myklebust.
Hosted by Institute of Clinical Medicine, UiO

- Leading position in Norway for B-cell malignancies clinical studies, with increasing number of trials testing immunotherapy with CAR T cells and bispecific antibodies
- Participation in studies that change clinical practice: Chemotherapy de-escalation and reduced use of radiotherapy in young patients (Lancet Oncol, J Clin Oncol)
- Strong focus on ex-vivo drug sensitivity testing and precision cancer medicine: First patient enrolled in IMPRESS-Norway cohort for CLL patients.

"From basic research and preclinical studies to precision medicine for B-cell malignancies"

STIFTELSEN KGJ Kristian Gerhard Jebsen Foundation

THE CENTRES

STRATEGIC RESEARCH AREA FOR OSLO UNIVERSITY HOSPITAL

Strategic Research Area in Cell and Gene Therapy (StratCell)

Headed by K. J. Malmberg. A. Pasetto and J-A. Kyte.

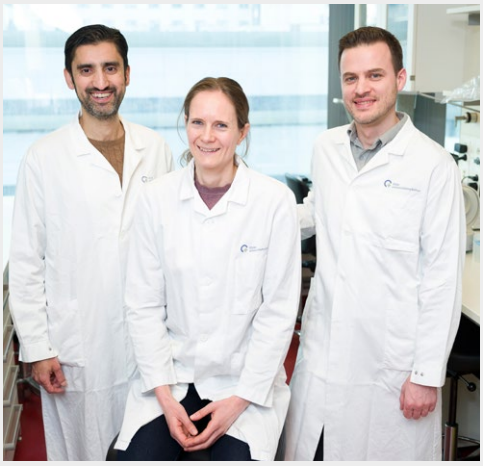
- Science: Advanced TCR-T, CAR-T and NK cell programs both in terms of identifying novel therapeutic concepts and transferring these into clinical GMP protocols.
- Strategic: Worked with the ACT center to establish the foundation for ATMP Norway, a national infrastructure for cell and gene therapy.
- Resources: Clinical trial funding obtained for individual projects and for a new Centre of Excellence in Precision Immunotherapy PRIMA.

"Fast-tracking clinical implementation of new innovative strategies for gene-editing of cytotoxic lymphocytes"

STRATEGIC RESEARCH AREA FOR OSLO UNIVERSITY HOSPITAL

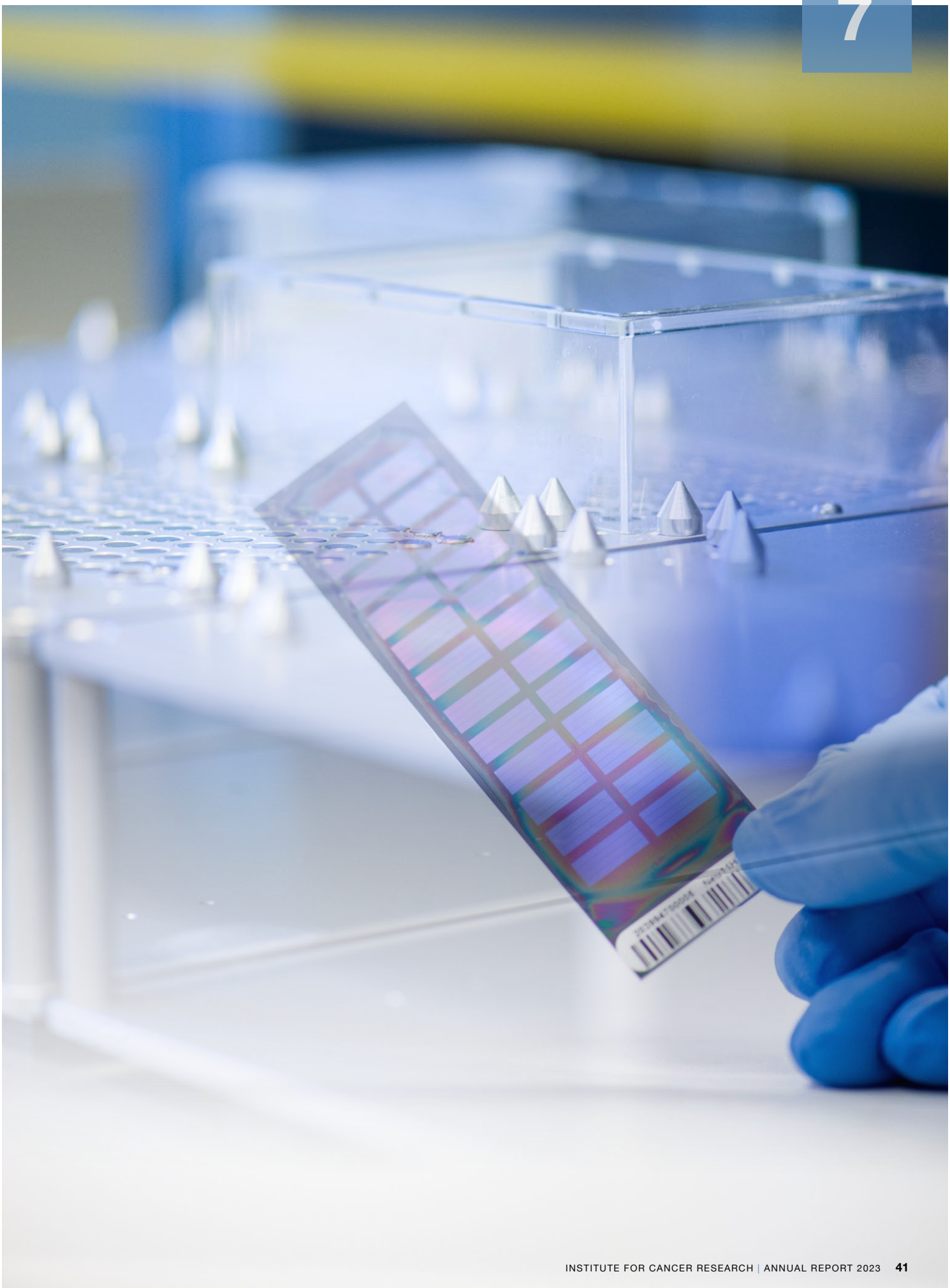
TEAM-ACT: Tumor Evolution in Advanced Models to Accelerate precision Cancer Therapy

Headed by Ragnhild A. Lothe and Anita Sveen



- We have included 300 tumor organoids and 150 patients in our living biobank of metastatic colorectal cancer (>1 metastatic lesion from 65% of the patients). Integrated pharmacogenomics of a custom drug library and gene expression and mutation profiles are ongoing.
- Prognostic molecular markers for patients treated by liver transplantation for metastatic colorectal cancer were identified. Comparisons with patients treated by liver resection indicated that the strong survival benefit from liver transplantation is not attributed to selection of favorable molecular risk profiles.
- Transcriptomics of multiregional tumor samples identify the potential for a molecular classification of colorectal cancer that is prognostic and less vulnerable to tumor heterogeneity.

"New treatment strategies of colorectal cancer"



THE CLINIC

The ICR as a gravity point in Oslo University Hospital Comprehensive Cancer Centre

Oslo University Hospital aims to be a leading cancer centre in Europe. The Institute for Cancer Research (ICR) is a competence hub with many world-leading research groups and environments, and its research is a cornerstone in our OECI-accredited Comprehensive Cancer Centre (CCC, accredited 2017, re-accredited 2023). The ICR function as a competence hub has been important in populating prioritized development areas in our CCC, such as the national precision cancer medicine initiative, our cell-gene therapy program, and the pre-clinical proton therapy unit. The importance of the CCC structure and integration of research and care is more recognized than ever within the EU for quality of cancer care, and access to a CCC or CCC network should be offered to all cancer patients in Europe by 2030. The Institute is situated near clinical cancer departments and diagnostic laboratories at the Radium Hospital campus, with Oslo Cancer Cluster and the Cancer Registry of Norway as neighbours. This proximity has been vital for our strong track record in translation and innovation. The fast-approaching opening of the new clinical building and the proton centre at the Radium Hospital will strengthen and potentiate this unique concept.

More patients in clinical trials is an expressed aim for the CCC, and many investigator-initiated clinical trials have been developed in close collaboration between researchers at ICR and clinical research groups at all locations of Oslo University Hospital. The tight connection among research groups at ICR and clinicians and diagnosticians at Oslo University Hospital is a crucial factor in instigating and improving investigator-initiated clinical trials by delivering new methodologies for patient stratification and including high-quality translational research connected to trials (see list of more than 20 trials, including the IMPRESS-Norway trial). The Institute has, for the last few years, been able to reach out to more cancer groups, and today, we cover all the common cancers together.

The extensive international collaboration involving researchers at ICR is also an essential asset for the CCC. In the integrated organization of cancer-related activities, the ICR will be a gravity point in the further development of Oslo University Hospital as a leading cancer centre in Europe and to meet the ambitions and opportunities given by the strong focus on cancer in Europe by both the Cancer Mission and Europe's Beating Cancer Plan

Sigbjørn Smeland
Head of Division of Cancer Medicine
Chair, OUH CCC Board

Translation and Innovation at the ICR

ICR aims to strengthen our innovation, translational research as well as collaboration, coordination and cohesion with clinical and diagnostic environments in OUH CCC. We have a Translational Research and Innovation Committee (TRIC) consisting of the head of each division that meets every month to review ongoing innovations and/or translational research projects from each division.

We have also initiated a series of symposia where we invite key researchers in clinical and diagnostic departments to open discussions on how we can interact more and improve cancer research.

The ICR is the institute that delivers the most DOFIs and patent applications across OUH and UiO according to our technology transfer office, Inven2. The TRIC reviews approximately 20 translation and innovation projects annually and a number of other projects are developing. The aims for TRIC are for the leadership to keep focus on this important aspect of ICR operations, for projects to get good discussions and feedback, and importantly to identify bottlenecks and find and mobilize competencies in our organization that can help address those.

ICR translation and innovation are funded and developed through collaborations with the UiO Growth House, the UiO/OUH SPARK programme, Inven2, and the RadForsk Investment fund, with HSE and RCN innovation grants and in collaboration with investors and industry partners.

Clinical intervention trials where Institute researchers play a prominent part

- ALICE: Atezolizumab Combined With Immunogenic Chemotherapy in Patients With Metastatic Triplenegative Breast Cancer
  ClinicalTrials.gov: #NCT03164993
  PI: Jon Amund Kyte
  Partner labs: Jon Amund Kyte, Hege Russnes

- ASAC - Aspirin as secondary prevention in colorectal cancer liver metastasis (www.asac.no)
  ClinicalTrials.gov; #NCT03326791
  PIs: Sheraz Yaqub and Kjetil Taskén

- BM7-PE - A Phase I/II Study with BM7PE Immunotoxin in Colorectal Cancer Patients
  ClinicalTrials.gov: #NCT 04550897
  PI: Geir Olav Hjortland
  Partner: Kjersti Flatmark

- BladMetrix - Urine-based surveillance study of bladder cancer recurrence
  PI: Guro E. Lind.
  Clinical manager: Rolf Wahlqvist

- COMIT-1 Combinatory ImmunoTherapy-1
  ClinicalTrials.gov: #NCT03644823
  PI: Åslaug Helland
  Partner lab.: Åslaug Helland

- COMIT-2 Immunotherapy combined with extensive radiotherapy for the treatment of stage IV non-small cell lung cancer
  EudraCT: #2021-003266
  PI: Vilde Haakensen
  Partners: Tarje Halvorsen, Bjørn Henning Grønberg, Kirill Neumann, Sigve Andersen

- DART – Durvalumab after chemo-radiotherapy for NSCLC (multinational phase II trial)
  ClinicalTrials.gov: #NCT04392505
  PI: Åslaug Helland
  Partner lab.: Åslaug Helland

- EVIDENT – Ex vivo drug sensitivity testing in metastatic colorectal cancer.
  ClinicalTrials.gov: #NCT05725200
  PI: Tormod K. Guren
  Partner lab.: Ragnhild A. Lothe

- ImPRESS-losartan - Imaging perfusion restrictions from extracellular solid stress.
  EudraCT: #2018-003229-27
  PI: Petter Brandal
  Partner labs: Kyrre Eeg Emblem, Åslaug Helland/Vilde D Haakensen

- IMPRESS-Norway – Improving public cancer care by implementing precision medicine in Norway
  ClinicalTrial.gov: #NCT04817956;
  https://impressnorway.no/en
  Institute participants:
  National PI: Åslaug Helland
  Trial Management Committee: Hege Russnes, Kjetil Taskén, Jon Amund Kyte; Trial Steering Committee: Eivind Hovig, Leonardo Meza-Zepeda, Ragnhild Lothe plus TMC members; Coordinator: Kajsa Johansson

- LD-VenEx - Phase II “feasibility” study of azacitidine in combination with low dose venetoclax in patients with acute myeloid leukemia
  EudraCT: #2020-005461-14
  PI: The Nordic AML Group
  Partner lab.: Jorrit Enserink

- METIMMOX-2: Metastatic pMMR/MSS Colorectal Cancer - Shaping Anti-Tumor Immunity by Oxaliplatin
  ClinicalTrial.gov: #NCT05504252
  PI: Anne Hansen Ree
  Partner lab.: Kjersti Flatmark

- METOXY-LACC - Altered Tumor Oxygenation by Metformin, a Potential Step in Overcoming Radiotherapy Resistance in Locally Advanced Cervical Cancer (LACC)
  ClinicalTrials.gov: #NCT04275713
  PI: Kjersti Bruheim
  Partner lab.: Heidi Lyng

- MITRIC - Microbiota Transplant to Cancer Patients Who Have Failed Immunotherapy Using Faeces From Clinical Responders
  ClinicalTrials.gov: #NCT05286294
  PI: Jon Amund Kyte
  Partner lab.: Jon Amund Kyte

- NAPEER - NeoAdjuvant PErsonalized therapy in Estrogen Receptor positive (+) breast cancer
  EudraCT: #2021-005850-27
  PI: Olav Engebråten
  Partner lab.: Mads H. Haugen / Gunhild M. Mælandsmo

- NIPEC-OXA; Normothermic Intraperitoneal Chemotherapy - Long Term in Peritoneal Metastases from Colorectal Cancer
  ClinicalTrials.gov: #NCT05056389
  PI: Mariusz Goscinski
  Partner lab.: Kjersti Flatmark

- NIPU – Nivolumab and ipilimumab +/- UV1 vaccine in second line treatment of mesotheliomas
  ClinicalTrials.gov: #NCT04300244
  PI: Åslaug Helland
  Partner lab.: Vilde Haakensen

- NorPACT-1/2 - Neo-adjuvant chemotherapy for pancreatic cancer
  ClinicalTrials.gov: #NCT02919787
  PI: Knut Jørgen Labori
  Partner lab.: Elin Kure

- PERELI – PEmigatinib and REtifanlimab in advanced dedifferentiated LIposarcoma
  CTIS: #2022-501993-21-00
  PI: Kjetil Boye
  Partner lab.: Jørgen Wesche

- Perioperative Propranolol in Robotic Assisted Laparoscopic Prostatectomy - A Pilot Study
  EudraCT: #2022-001184-28
  PI: Shivanthe Sivanesan
  Partner labs: Kristin A. Taskén/ Gunhild M. Mælandsmo

- Sequential neoadjuvant ifosfamide and doxorubicin in localized high-grade soft tissue sarcoma of extremities and trunk wall
  ClinicalTrials.gov: #NCT04776525
  PI: Kjetil Boye
  Partner lab.: Jørgen Wesche

THE INTERNATIONAL NETWORK

ICR members report collaborations with researchers at 167 institutions in 32 countries world-wide

AUSTRALIA
- Kinghorn Cancer Centre, Sydney
- Monash University, Melbourne

AUSTRIA
- Institute of Pathophysiology Biocenter, Innsbruck Medical University, Innsbruck
- Medical University of Vienna, Vienna

BELGIUM
- Catholic University of Brussels, Brussels
- Ghent University, Ghent
- Katholieke University Leuven, Leuven
- Universiteit Hasselt, Genk
- UZ Leuven, Leuven

CANADA
- McGill University, Montreal
- Princess Margaret Hospital, Toronto
- University of Ottawa, Ottawa

CROATIA
- Centre of Oncology, Split
- University of Zagreb, Zagreb

CZECH REPUBLIC
- Charles University, Prague
- Institute of Experimental Biology, Masaryk University, Brno
- National Institute of Public Health, Prague

DENMARK
- Aalborg University Hospital, Aalborg
- Aarhus University Hospital, Aarhus
- Copenhagen University Hospital, Copenhagen
- University of Copenhagen, Copenhagen
- University of Southern Denmark, Odense

ESTONIA
- Hematology and Oncology Clinic, Tartu

FINLAND
- Biomedicum Helsinki, University of Helsinki and Helsinki University Hospital, Helsinki
- Finnish Institute of Molecular Medicine, Nordic EMBL partnership, Helsinki
- Pharmatest Services Ltd, Turku
- Tampere University of Technology, Tampere
- The Southern Finland Regional Cancer Center
- Zora Oy, Espoo

FRANCE
- Centre Léon Bérard, Lyon
- Centre National de Génotypage, Paris
- EurOPDX - European Consortium on Patient-derived Xenografts, Paris
- Institut Gustave Roussy, Paris
- Institut National de la Sante et de la Recherche Medicale, Paris
- Institute Curie, Paris
- Institute of Systems and Synthetic Biology Genopole, UEVE, CNRS, Évry
- International Agency for Research on Cancer (IARC), Lyon
- Université de Lorraine, Nancy
- Université Lyon, Villeurbanne
- Université Paris-Sûd, Orsay

GERMANY
- EMBL, Heidelberg
- Heidelberg University Hospital, Heidelberg
- Jacobs University, Bremen
- University of Bayreuth, Bayreuth
- University of Bochum, Bochum
- University of Cologne, Cologne
- University of Freiburg, Freiburg
- University of Heidelberg, Heidelberg
- University of Mainz, Mainz
- University of Marburg, Marburg
- University of Stuttgart, Stuttgart

GREECE
- National and Kapodistrian University of Athens, Athens
- National Centre for Scientific Research "Demokritos", Athens
- University of Ioannina, Ioannina

HUNGARY
- National Institute of Oncology, Budapest
- University of Szeged, Szeged

ICELAND
- University of Iceland, Biomedical Center, Reykjavik

INDIA
- Indian institute of Technology, Hyderabad
- Savitribai Phule Pune University, Pune

IRELAND
- National Institute for Bioprocessing Research and Training (NIBRT), Dublin
- Trinity College, Dublin

ISRAEL
- Technion - Israel Institute of Technology, Haifa
- Weizmann Institute, Rehovot

ITALY
- European Institute of Oncology, Milan
- IFOM, Milan
- International School for Advanced Studies, Trieste
- Istituto Nationale di Tumori, Milano
- The Rizzoli Institute, Bologna
- University of Bologna, Bologna
- University of Padova, Padova
- University of Salento, Lecce

LITHUANIA
- National Cancer Institute, Vilnius

NORWAY
- Cancer Registry of Norway, Oslo
- Haukeland University Hospital, Bergen
- Norwegian University of Life Sciences, Ås.
- Norwegian University of Science and Technology, Trondheim
- Stavanger University Hospital, Stavanger
- Trondheim University Hospital-St. Olavs Hospital, Trondheim
- University Hospital of Northern Norway, Tromsø
- University of Bergen, Bergen
- University of Oslo, Oslo

POLAND
- Faculty of Biotechnology, University of Wroclaw, Wroclaw
- Jagiellonian University, Kraków
- Maria Sklodowska-Curie National Research Institute of Oncology, Warsaw
- University of Gdansk, Gdansk

PORTUGAL
- Institute of Molecular Pathology and Immunology, University of Porto
- Portuguese Oncology Institute, Porto

ROMANIA
- Center for Innovation in Medicine, Bucharest
- Horia Hulubei National Institute for Physics and Nuclear Engineering
- Bucharest - Magurele

RUSSIA
- Institute of Cytology and Genetics, Novosibirsk

SINGAPORE
- Cancer Science Institute of Singapore, Singapore

SPAIN
- Biocruces Bizkaia Health Research Institute, Barakaldo
- CABIMER, University of Sevilla, Sevilla
- Centre for Biological Studies, Madrid
- Fundacion Instituto Valenciano de Oncologica (FIVO), Valencia
- ICGC, Technical validation group and Ivo Gut, Barcelona
- University of Lleida, Lleida

- University of Valencia, Valencia
- Universitat Politècnica de València, Valencia
- Vall d'Hebron Institute of Oncology, Barcelona

SWEDEN

- Karolinska Institutet, Stockholm
- Lund University, Lund
- Stockholm School of Economics, Stockholm
- Stockholm University
- Swedish Institute for Health Economics, Lund
- The Sahlgrenska Academy at the University of Gothenburg, Gothenburg
- Uppsala University Hospital, Uppsala

SWITZERLAND

- University Hospital Zurich, Zurich

THE NETHERLANDS

- Erasmus University Medical Center, Rotterdam
- Leiden University Medical Centre, Leiden
- Netherlands Cancer Institute (NKI), Amsterdam
- Radboud University Nijmegen, Nijmegen
- The Netherlands Proteomics Centre, Utrecht
- University Medical Center, Groningen
- Utrecht University, Utrecht
- VU Medical Center, Amsterdam

TUNISIA

- University of Tunis, Tunis

UNITED KINGDOM

- Cambridge Cancer Institute, Cambridge
- Cancer Research UK, London
- Hampshire Hospitals/Southampton University, Southampton
- Institute of Cancer and Genomic Sciences, University of Birmingham, Birmingham
- London Research Institute,The Francis Crick Institute, London
- Newcastle University, Newcastle upon Tyne
- Queen's University Belfast
- Royal National Orthopaedic Hospital, Stanmore, Middlesex
- The Beatson Institute for Cancer Research, Glasgow
- The European Bioinformatics Institute (EMBL-EBI), Hinxton
- University College London Medical School, UCL, London
- University of Cambridge, Cambridge
- University of Liverpool, Liverpool
- University of Manchester, Manchester
- University of Oxford, Oxford
- Wellcome Sanger Institute, Hinxton

USA

- Buck Institute for Research on Aging, Novato, California
- Dana Farber Cancer Institute, Boston, Massachusetts
- Dartmouth College, Hanover, New Hampshire
- Duke University Medical Center, Durham, North Carolina
- Fred Hutchinson Cancer Research Center, Seattle, Washington
- Georgetown University, Washington DC
- Harvard University, Boston, Massachusetts
- Johns Hopkins Medicine, Baltimore, Maryland
- Knight Cancer Institute, Oregon Health Sciences University
- Lawrence Berkeley National Laboratory, Berkeley, California
- Lineberger Comprehensive Cancer Center, Chapel Hill, North Carolina
- Masonic Cancer Center and University of Minnesota, Minneapolis
- Massachusetts General Hospital, Boston, Massachusetts
- MD Anderson Comprehensive Cancer Center, Houston, Texas
- MedKoo Biosciences, Morrisville, North Carolina
- Memorial Sloan Kettering Cancer Center, New York
- National Institutes of Health (NIH), Bethesda, Maryland
- Oregon State University, Corvallis, Oregon
- Princeton University, New Jersey
- Rutgers Cancer Institute of New Jersey
- Stanford University, California
- The Mount Sinai Hospital, New York
- The University of Kansas Hospital, Kansas
- Tisch Cancer Institute, New York
- UCSF, Helen Diller Family Cancer Centre, San Francisco, California
- University of Albany, New York
- University of California, Berkeley, California
- University of Chicago, Illinois
- University of Colorado, Denver, Colorado
- University of Illinois, Champaign, Illinois
- University of Washington, Seattle, Washington
- Washington University, St Louis, Missouri
- Weill Medical College of Cornell University, New York

THE NEXT GENERATION

Some of the new recruits bringing in new competence in 2023

Ann-Christin Borchers
Postdoctor
Ann-Christin recently finished her PhD in the group of Christian Ungermann at University of Osnabrück, Germany, on studies of how endosomal Rab GTPases are activated (Borchers et al. , PNAS, 2023). She has experience with yeast genetics, molecular biology methods and biochemical reconstitution assays. In Harald Stenmark´s group, she will study a new type of selective autophagy, simaphagy, which prevents hypersignalling activity in cells. She is a member of the Stenmark group, Cellular Membrane Dynamics, Department of Molecular Cell Biology.

Alberto López Sánchez
PhD student
Alberto has a background in bioinformatics, with several years of professional experience in both the private and academic sectors in the field of AI. His PhD focuses on applying machine learning to multi-omics data for cancer research. He is a member of the Aittokallio group, Computational Systems Medicine in Cancer Department of Cancer Genetics.

Sergio Miguel Castaneda Zegarra
Postdoctor
Sergio Miguel Castaneda Zegarra has a PhD from NTNU on complex transgenic mouse models to study in cancer immunology. He has an entrepreneurial mind-set and utilize his expertise in the preclinical development of experimental targeted therapeutics developed in the project group of Anette Weyergang, associated with the Berg group, Photochemical Internalization, Department of Radiation Biology.

Christian Kranjec
PhD researcher
C. Kranjec defended his PhD in UK and thereafter worked in the University of Cambridge as a cancer researcher. He characterized viral activities for the induction of neoplasia. He came to Norway (NMBU) in 2018 and worked on a EU project related to antibiotic–resistant infections. His experience in cell biology and microscopy is instrumental in his work on molecular pathology of colorectal cancer in the Lothe group at Department of Molecular Oncology.

Emil Løvstakken
PhD student
Emil has a master's degree from OsloMet. He will investigate alterations in the immune cell tumor microenvironment in response to new therapies in syngeneic murine models of peritoneal metastasis from ovarian cancer. Member of the Flatmark Group, Translational Cancer Therapy, Department of Tumor Biology.

Julia Zeun
Postdoctor
Julia Zeun started as a postdoc in the Experimental Immunotherapy group (Olweus) at the Dept of Cancer Immunology in April 2023. She received her PhD from the Friedrich-Alexander-University Erlangen-Nuremberg, Germany, in the group of Anita Kremer/Andreas Mackensen (CAR T cell focus). Julia has extensive experience with advanced mouse models and T cell biology with a particular focus on transplantation immunology. She is also an eager outdoors person, who visited the Norwegian mountains long before she became a postdoc at the ICR!

Victor Kalbskopf
Special engineer
Victor Kalbskopf, PhD, is a passionate and curious bioinformatician. He has a background in pipeline development and population genetics. He values efficiency and consistency and enjoys solving complex problems while serving users at the Bioinformatics Core facility. He is a new member of the Lorenz group, Unit Genomics and Bioinformatics, at the Department of Core Facilities.

ICR Career Development Plans for Staff

ICR is implementing a new career development programme in collaboration with all staff categories with a representative working group. This approach ensures that the programme is tailored to the unique needs of each staff member, including Ph.D. students, postdocs, project leaders, and engineers.

In a comprehensive needs assessment, the working group conducted various activities. These included gap analysis versus what is offered by OUH and UiO, online questionnaires for different staff categories (total respondents n=206), open meetings, specific meetings with each of the four staff categories, and a group leader seminar. The result was a clear identification of critical needs in training and career development for each staff category that are not met at an institutional level by OUH/UiO.

To address these needs, the ICR has devised an action plan to fill the gaps and ensure a comprehensive career development program for each staff category.

This new programme with career development plans aims to improve ICR staff's professional growth and development across all categories, ensuring they have access to the resources and opportunities necessary for success in their respective fields. By addressing the needs of each staff category, the ICR hopes to create a more robust and supportive environment for professional development.

Development of the competence programme for engineers started mid-2023 and is in good progress. A tailored Leadership training course for our Project Leaders was designed and contracted in the fall of 2023 and took place in March 2024 (see picture).

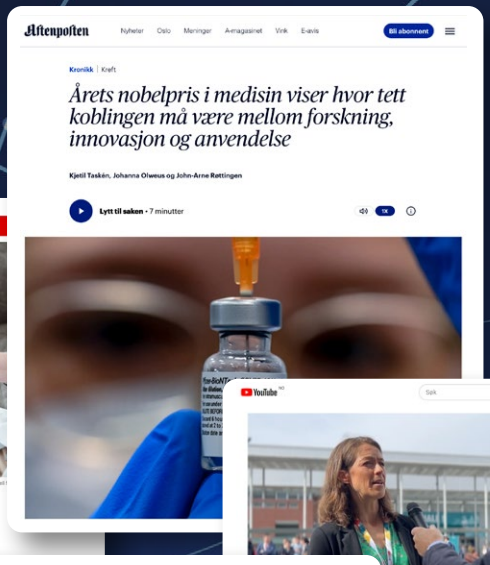
THE COMMUNICATION IS KEY

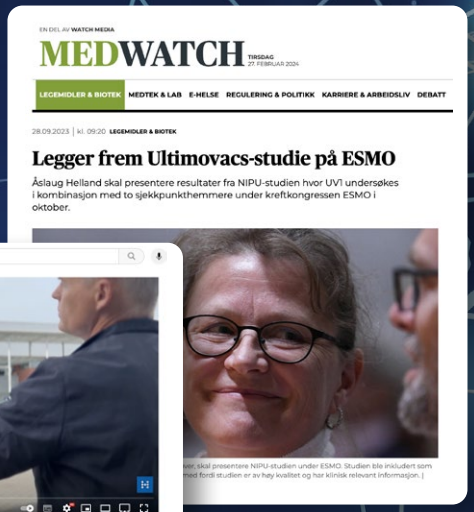
Communication in cancer research is vital for facilitating exchange of knowledge among researchers and clinicians and for promoting the connection between the research community and the wider public. In 2023, our researchers from ICR published more than 160 peer-reviewed papers, participated in and organized national and international meetings, and communicated through talks, interviews, newspaper contributions, and around 800 social media posts. Through this, ICR demonstrated its commitment to advancing cancer diagnosis and treatment as well as to public outreach.

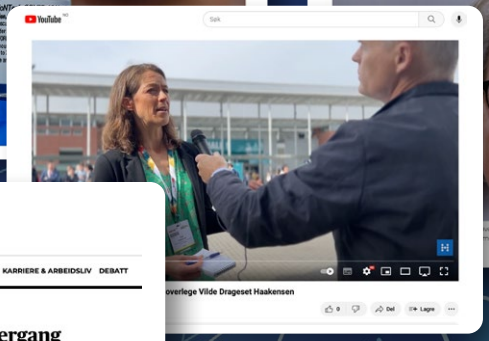
810
Original Social Media Postings#

206
Scientific talks, nationally

161
Scientific talks, internationally







59
Scientific & popular meetings

247
National media*

**: talks, interviews, newspaper correspondence, viewpoints and debate articles on popular science and research policy*

#: original postings about science in social media (Twitter, LinkedIn etc)

PUBLICATIONS

Publications 2023

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Stability of metabolic tumor volume may enable radiotherapy dose painting in anal cancer
Phys Med, 114, 103151

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Cancers (Basel), 15 (16)

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Standardized assays to monitor drug sensitivity in hematologic cancers
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Axcrona K, Aas K, **Axcrona U**, **Skotheim RI** (2022)
Re: Spatially Resolved Clonal Copy Number Alterations in Benign and Malignant Tissue
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Int J Cancer, 152 (5), 945-951

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Zhen Y, **Stenmark H** (2024)
A dual-purpose fusion complex in autophagy
Cell Res (in press)

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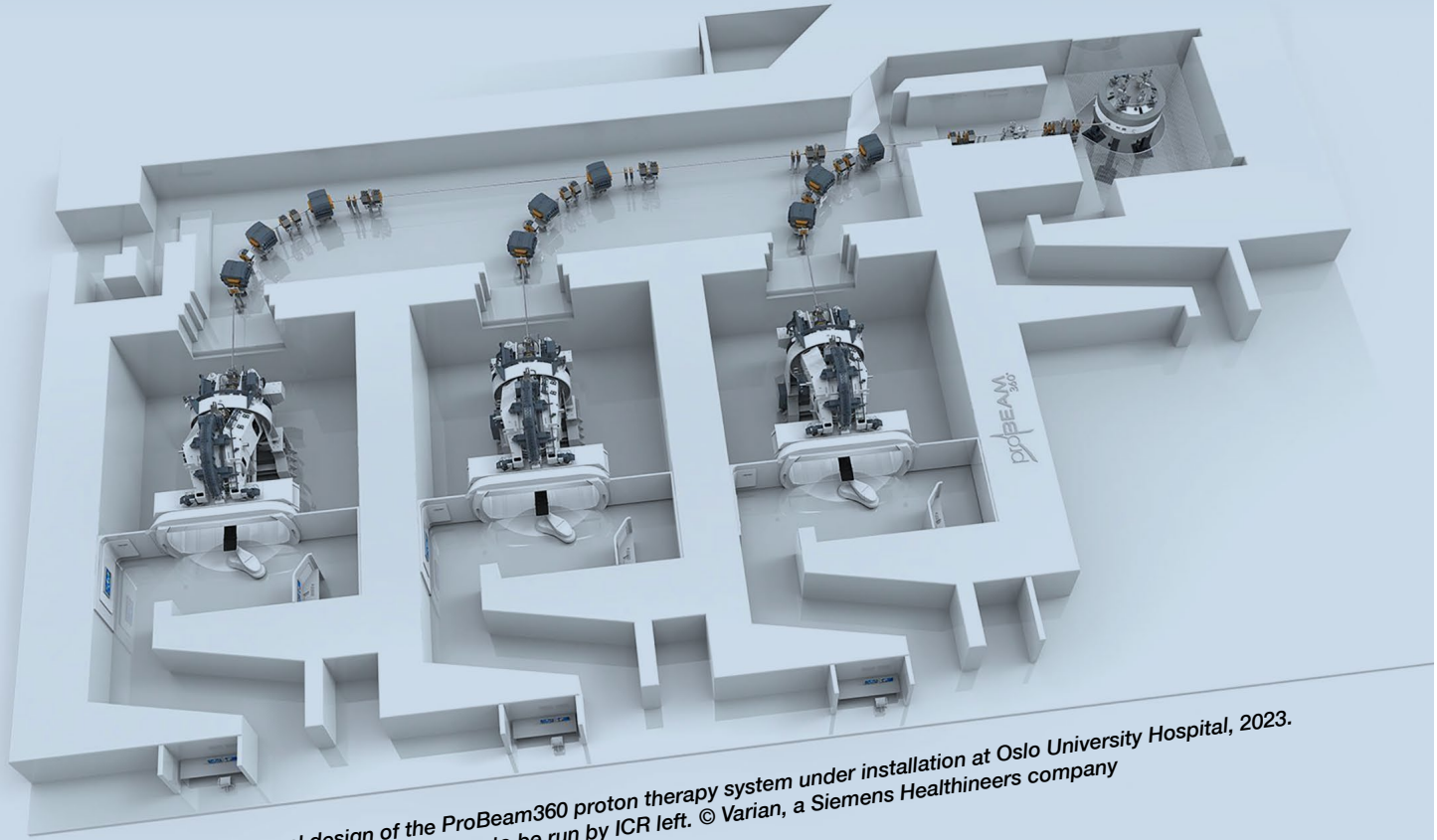

Image shows the conceptual design of the ProBeam360 proton therapy system under installation at Oslo University Hospital, 2023. Cyclotron "Ellen" upper right, preclinical gantry to be run by ICR left. © Varian, a Siemens Healthineers company