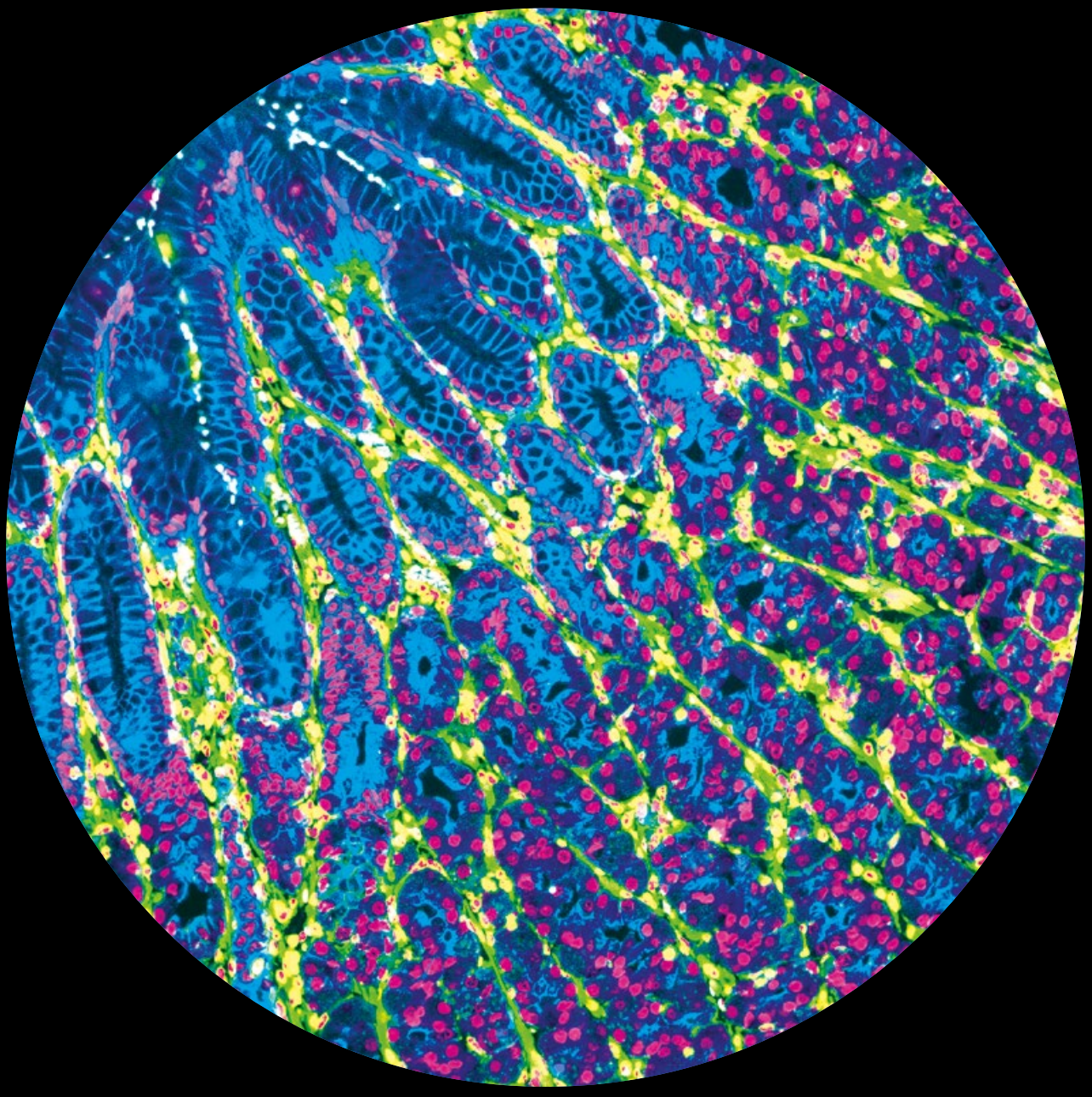
INSTITUTE FOR CANCER RESEARCH

ANNUAL REPORT 2022



EXCELLENCE IN FIGHTING CANCER

OSLO UNIVERSITY HOSPITAL | HELSE SØR-ØST | UNIVERSITY OF OSLO

“Research and innovation with patient benefit in mind”

EDITORIAL COMMITTEE:
Kjetil Taskén
Johanna Olweus
Peter Wiedswang
Kari Aalrust Berger

DESIGN:
Espen Liland

PHOTOGRAPHY:
Terje Heiestad
Øystein Horgmo, UiO
Peter Holgersson
Rolf Skotheim
Kjetil Taskén
Pooja Kumari

FRONT PAGE:
Spatial transcriptomics is being used to study intratumor heterogeneity in cancer. Normal stomach epithelia surrounding a gastrointestinal stromal tumor. Fluorescent morphology markers allow identifying and capturing specific cell types to perform transcriptomic analysis within a spatial context. Technology has been established by the Genomics Core Facility at the Department of Core Facilities using the nanoString GeoMx platform (Marie K. Gillstrøm, Susanne Lorenz, and Leonardo A. Meza-Zepeda). The instrument was financed by the University of Oslo.

LAST PAGE:
ICR – Research building by night (Peter Holgersson)

PAPER: 150/300 Profimatt
CIRCULATION: 800

Contents

Dedicated to Cancer Research

I am proud to present our Annual Report for 2022. The eleven key topics of the report encapsulates the work and output from our research organisation, the Institute of Cancer Research (ICR), and we think it communicates the key features of what we do. As you will see (topic 2), our scientific output is more than 200 peer-reviewed papers per year, of which more than half have 1st or senior author at the ICR. I am also happy to say that the quality is increasing (by median impact factor) and that more than 60 of our papers were in journals with IF>10, but more importantly contribute important discoveries (see selected papers, topic 2).

With outstanding research, the ICR should also excel in recruitment, training and career development, translation and innovation, dissemination and public outreach, and in collaboration in Norway and abroad (all covered in the following chapters). Notably, ICR groups are key partners in more than 20 clinical trials and lead more than 120 translation and innovation projects, many also with key industry partners (topic 8). Members of the ICR also gave almost 300 scientific and popular talks, organised close to 100 meetings and events, and disseminated our science and participated in the public debate with close to 300 news items in 2022.

The competence of our staff is the most valuable asset of the ICR (topics 3, 4 and 5). Our 380 employees in 6 research departments, 25 research groups, 30 project groups and 6 core facility units represent a competence hub that allows Oslo University Hospital to go into new strategic areas such as precision cancer medicine and cell therapy as we can populate such new initiatives. From 2023 we are also stepping up our involvement in radionuclide and preclinical proton therapy research. These strategic developments also create new career paths.

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

March, 2023

Kjetil Taskén
Head of the ICR

“The competence of our staff is the most valuable asset of the ICR ...”

The Institute

6 research departments | **25** research groups | **6** core facilities | **30** project groups

The Institute for Cancer Research is organized in 6 research departments with 25 research groups and a total >55 PIs, and one Department of (6) Core Facilities.

- **Chief Administrative Officer** — Kari Aalrust Berger
  - **Administration**
  - **Service Lab**
- **HEAD OF INSTITUTE** — Kjetil Taskén

CANCER GENETICS — Therese Sørlie

- **Gry Aarum Geitvik** — Lab Technology
- **Breast Tumor Initiation** — Therese Sørlie
- **Computational Systems Medicine in Cancer** — Tero Aittokallio
- **Translational Studies on Solid Tumors** — Åslaug Helland
- **Molecular Biology of Breast Cancer** — Hege Russnes

CANCER IMMUNOLOGY — Johanna Olweus

- **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
- **Immunomodulation and Targeted Therapies** — Mouldy Sioud
- **Cell Signaling and Immune Regulation** — Kjetil Taskén

MOLECULAR CELL BIOLOGY — Harald A. Stenmark

- **Cellular Membrane Dynamics** — Harald A. Stenmark
- **Cancer Molecular Medicine** — Jorrit Enserink
- **Tumor-Host Biology** — Tor Erik Rusten
- **Intracellular Transport** — Kirsten Sandvig, retired 30.6

MOLECULAR ONCOLOGY — Ragnhild A. Lothe

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

RADIATION BIOLOGY — Kristian Berg

- **Photochemical Internalization** — Kristian Berg
- **Targeted Alpha Therapy** — Asta Juzeniene from 1.8
- **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

- **Genomics and Bioinformatics** — Susanne Lorenz
- **Advanced Light and Electron Microscopies** — Ellen Skarpen
- **Flow Cytometry and Preclinical Imaging** — Trond Stokke, retired 30.11; Idun Dale Rein from 1.12

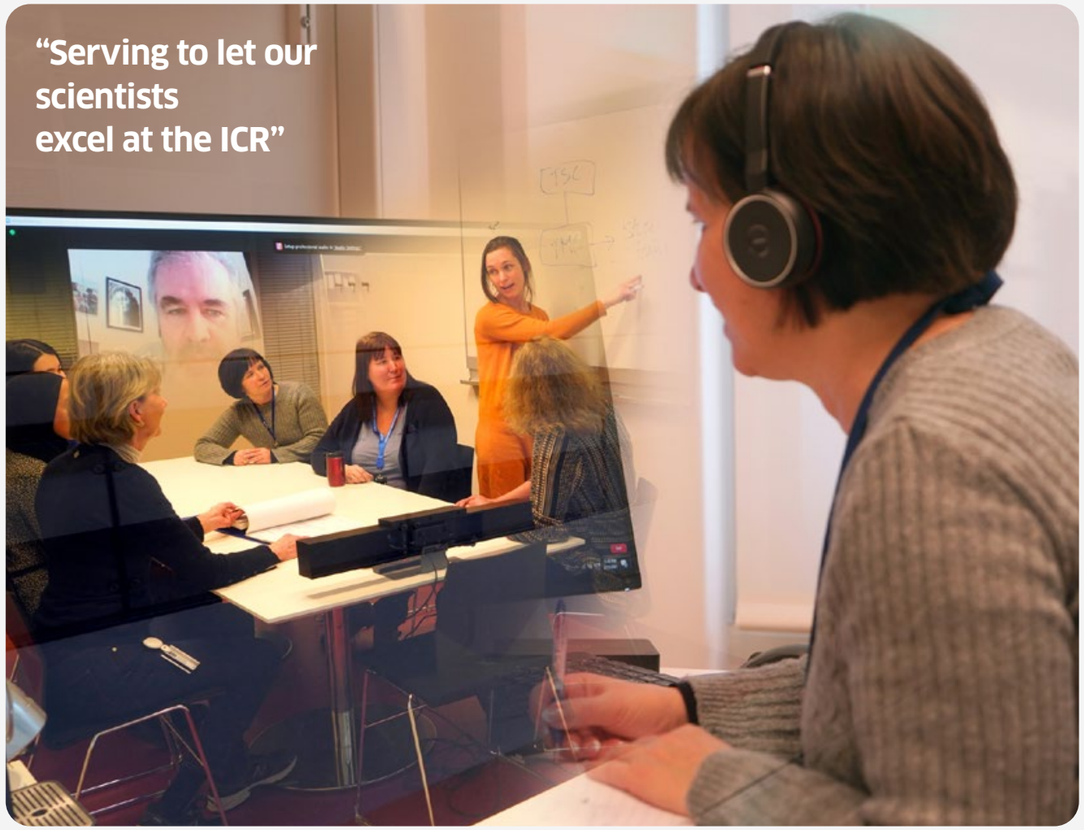
The Institute

Administration

Kari Aalrust Berger, Mona Hagen, Marit Osland Haugli, Linda Uv Mjøen, Ikram Mahnin, Gro Live Fagereng, Helene Wold Ranum. Absent: Yong Fang Po, Yili Gan, Peter Wiedswang

Chief Administrative Officer: Kari Aalrust Berger / Employees: 10

Administration | **Service Lab**



Under the leadership of Kari Aalrust Berger, the ICR administrative unit of ten people 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 web site, coordinating the ICT-support group
- Responsibility for ICR conference and meeting facilities
- Operating Service Lab with washing and autoclaving facility for the building

Marit Osland Haugli – Head Engineer at the Institute of Cancer Research (ICR) – was awarded the prize ”Employee-of-the-year 2022”. The award committee and nomination describe Marit Osland Haugli as an employee that always goes the extra mile for her colleagues. Marit retired on December 31, and we thank her for her outstanding efforts and service over 34 years!

We are also warmly welcoming Karen-Marie Heintz to the ICR and the Administration from January 1, 2023.

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 last met January 18-19, 2021 and reviewed vision, research strategies and future plans as well as performance of the Institute and its different departments, and wrote in their report: “Overall, the SAB was very impressed by the excellent standard of the scientific activities at ICR.

The SAB provided feedback and recommendations to the Institute and each department. In 2021-22 we have worked with SAB feedback and made plans for how to use and integrate the SAB feedback in our forward strategic work. This has involved:

Development of an ICR career development program
A Working Group for Career Development for different categories of staff is in operation:

- Career development activities that are available institutionally has been mapped.
- Courses for postdocs, researchers, method-specialists etc. has been surveyed.
- Additional dedicated activities based on a gap analysis have been suggested.

Actions:

- Mentoring arrangements for different categories of staff are being organised.
- Leadership and project management courses will be offered for project leaders.
- Career Plans are being formalized.
- Practices and available courses and programmes have been documented.

Development of a Strategy plan for Systems Cancer Biomedicine at ICR
A Working Group has been mandated to look at:

- Future needs for bioinformatics, computational biology, biostatistics and systems biomedicine.
- How to develop and maintain a strong computational research environment that continues to produce front line research, develop new methods and build competence at ICR.
- How to best organize the cutting edge computational biology research environment at ICR and ensure optimal interaction with UiO and OUH.

The ICR is currently preparing for our next SAB visit in May 2023, ICR objectives and future plans for 2023-24 will be revised after the SAB’s feedback has been received.

The Highlights

INTERNATIONAL CONFERENCE ORGANIZATION

The Norwegian cancer symposium – a 2 day event bringing together top-ranking researchers, clinicians, industry, and policymakers, was successfully organized by Kristin Austlid Taskén, Alicia Llorente, Heidi Lyng, Ingrid Jenny Guldvik and Rolf Skotheim from the ICR. The symposium attracted 141 attendants.

MAJOR NORDIC AWARD

The 2022 Anders Jahre Award for Medical Research - NOK 1 million prize - was awarded to **Professor Harald A. Stenmark**. Stenmark received this award for his groundbreaking research on the structure and function of membrane proteins.

INTERNATIONAL AND NATIONAL RECOGNITION OF OUR YOUNG TALENTS

"RCN Young Talents Grant" to Marina Vietri (picture) and "Young Investigator Prize from Oncology Forum" to Chloe B. Steen. Helene Knævelsrud received an ERC Starting Grant to conduct the project FINALphagy: Final act of the autophagy symphony: Wholeorganism orchestration of autophagy termination.

A NORWEGIAN CENTER OF EXCELLENCE

was awarded to the Precision Immunotherapy Alliance – PRIMA – a consortium of seven groups of which three are affiliated with the Institute for Cancer Research at the Department of Cancer Immunology, including the groups of co-Directors Karl-Johan Malmberg and Johanna Olweus and that of June Myklebust. The center will receive 155 mill NOK for 5+5 years.

MAJOR INTERNATIONAL FUNDING

A 6-mill EUR grant from the European Commission Cancer Mission program was awarded to the PRIME-ROSE consortium for precision medicine implementation, led by Kjetil Taskén.

IMPRESS-Norway

- a national prospective precision cancer medicine study, included > 850 patients for molecular profiling, reported on >750 and included >150 into treatment cohorts. Key leaders: Hege Russnes and Åslaug Helland.

IMPRESS NORWAY

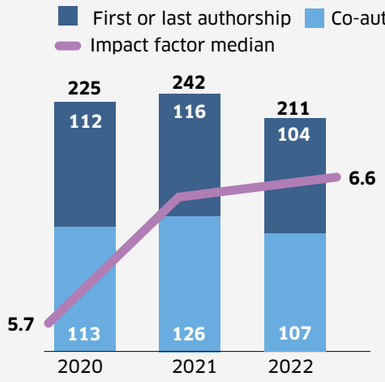
CLINICAL TRIAL PUBLISHED IN NATURE MEDICINE

Jon Amund Kyte´s group published the ALICE trial, demonstrating that treatment of patients with metastatic triple-negative breast cancer with immunotherapy in addition to immune-stimulating chemotherapy results in increased progression-free survival. The study received great attention in the media.

https://www.vjoncology.com/video/na_pkifrlac-immunotherapy-in-breast-cancer/

The Achievements

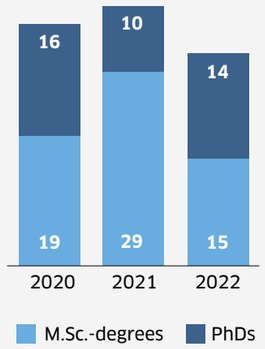
Articles published



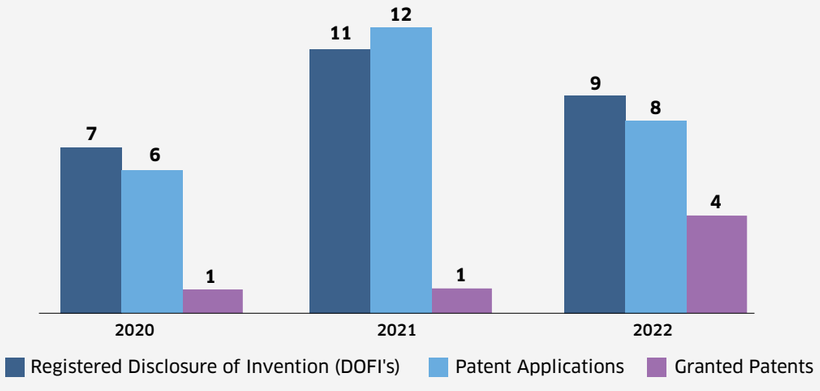
IMPACT FACTOR

	2020	2021	2022
Median	5.7	6.5	6.6
Mean	7.6	8.1	9.2

Completed PhDs and M.Sc.-degrees



DOFIs and Patent Applications



Selected papers with key authors from the Institute:

- **Røssevold AH**, **Andresen NK**, Bjerre CA, Gilje B, Jakobsen EH, Raj SX, Falk RS, Russnes HG, Jahr T, Mathiesen RR, Lømo J, Garred Ø, **Chauhan SK**, **Lereim RR**, **Dunn C**, Naume B, **Kyte JA** (2022)
  Atezolizumab plus anthracycline-based chemotherapy in metastatic triple-negative breast cancer: the randomized, double-blind phase 2b ALICE trial
  Nat Med, 28 (12), 2573-2583

  Main finding: Clinical efficacy in metastatic triple-negative breast cancer patients treated with combined immune-stimulating chemotherapy and immunotherapy.

- **Bay LTE**, **Syljuåsen RG**, **Landsverk HB** (2022)
  A novel, rapid and sensitive flow cytometry method reveals degradation of promoter proximal paused RNAPII in the presence and absence of UV
  Nucleic Acids Res, 50 (15), e89

  Main finding: A new method to study RNA polymerase II chromatin binding revealing insights into the transcription cycle with and without UV DNA damage.

- Haroun-Izquierdo A, **Vincenti M**, **Netskar H**, van Ooijen H, Zhang B, Bendzick L, **Kanaya M**, Momayyezi P, **Li S**, **Wiiger MT**, **Hoel HJ**, **Krokeide SZ**, Kremer V, Tjonnfjord G, Berggren S, Wikström K, Blomberg P, Alici E, Felices M, Önfelt B, Höglund P, Valamehr B, Ljunggren HG, Björklund A, Hammer Q, **Kveberg L**, Cichocki F, Miller JS, **Malmberg KJ**, Sohlberg E (2022)
  Adaptive single-KIR$^+$NKG2C$^+$ NK cells expanded from select superdonors show potent missing-self reactivity and efficiently control HLA-mismatched acute myeloid leukemia
  J Immunother Cancer, 10 (11)

  Main finding: A novel GMP-compliant protocol to expand clinically relevant numbers of single self-killer immunoglobulin-like receptor+ adaptive NK cells from third-party 'superdonors' that provide strong alloreactivity in a mouse model of AML as well as against primary AML blasts ex vivo.

- **Yin Y**, **Athanasiadis P**, **Karlsen L**, **Urban A**, **Xu H**, Murali I, Fernandes SM, Arribas AJ, Hilli AK, **Taskén K**, Bertoni F, Mato AR, Normant E, Brown JR, Tjønnfjord GE, **Aittokallio T**, **Skånland SS** (2022)
  Functional Testing to Characterize and Stratify PI3K Inhibitor Responses in Chronic Lymphocytic Leukemia
  Clin Cancer Res, 28 (20), 4444-4455

  Main finding: Novel treatment vulnerabilities for chronic lymphocytic leukemia patients who are intolerant or refractory to the PI3K inhibitor idelalisib, and stratification of PI3K inhibitor responders by ex vivo functional profiling.

- **Ravindran V**, Wagoner J, **Athanasiadis P**, Den Hartigh AB, Sidorova JM, Ianevski A, Fink SL, Frigessi A, White J, Polyak SJ, **Aittokallio T** (2022)
  Discovery of host-directed modulators of virus infection by probing the SARS-CoV-2-host protein-protein interaction network
  Brief Bioinform, 23 (6)

  Main finding: Network approaches enable systematic identification of host targets and selective compounds that modulate the SARS-CoV-2 interactome.

- **Radulovic M**, **Wenzel EM**, **Gilani S**, Holland LK, **Lystad AH**, Phuyal S, Olkkonen VM, **Brech A**, Jäättelä M, Maeda K, **Raiborg C**, **Stenmark H** (2022)
  Cholesterol transfer via endoplasmic reticulum contacts mediates lysosome damage repair
  EMBO J, 41 (24), e112677

  Main finding: Lipid transfer via the endoplasmic reticulum and lysosome contact sites enhances cell survival by promoting lysosome repair.

- **Skånland SS**, Inngjerdingen M, **Bendiksen H**, York J, Spetalen S, Munthe LA, Tjønnfjord GE (2022)
  Functional testing of relapsed chronic lymphocytic leukemia guides precision medicine and maps response and resistance mechanisms. An index case
  Haematologica, 107 (8), 1994-1998

  Main finding: Mechanistic insights into clinical response and resistance to targeted therapies, as well as proof-of-concept for direct drug testing as a method to guide effective personalized therapy for relapsed chronic lymphocytic leukemia.

- **Sivanesan S**, **Taskén KA**, **Grytli HH** (2022)
  Association of β-Blocker Use at Time of Radical Prostatectomy with Rate of Treatment for Prostate Cancer Recurrence
  JAMA Netw Open, 5 (1), e2145230

  Main finding: Use of a nonselective beta blocker at time of radical prostatectomy is associated with reduced treatment for prostate cancer recurrence.

- **Bergsland CH**, **Jeanmougin M**, **Moosavi SH**, Svindland A, **Bruun J**, **Nesbakken A**, **Sveen A**, **Lothe RA** (2022)
  Spatial analysis and CD25-expression identify regulatory T cells as predictors of a poor prognosis in colorectal cancer
  Mod Pathol, 35 (9), 1236-1246

  Main finding: Spatial proximity of Tregs and cytotoxic T cells is associated with adverse prognosis in colorectal cancer, as shown by fluorescence-based multiplex immunohistochemistry.

- **Fiorito E**, **Szybowska P**, **Haugsten EM**, **Kostas M**, **Øy GF**, **Wiedlocha A**, **Singh S**, **Nakken S**, **Mælandsmo GM**, Fletcher JA, **Meza-Zepeda LA**, **Wesche J** (2022)
  Strategies to inhibit FGFR4 V550L-driven rhabdomyosarcoma
  Br J Cancer, 127 (11), 1939-1953

  Main finding: Identification of a specific FGFR4 inhibitor that potently abrogates tumour growth driven by mutant FGFR4 in rhabdomyosarcoma.

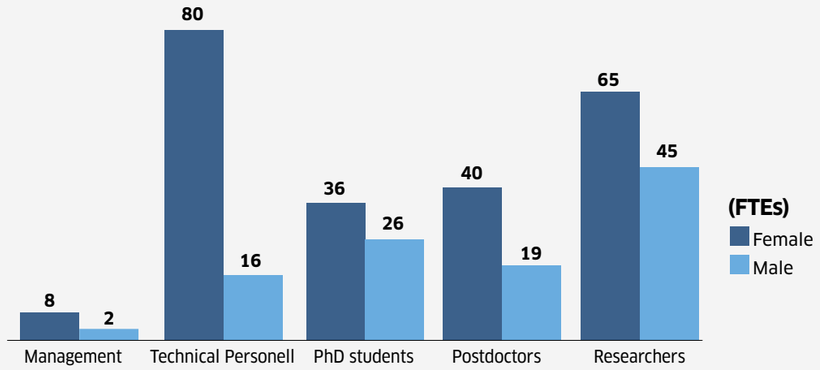
- **Georgiesh T,** Aggerholm-Pedersen N, Schöffski P, Zhang Y, Napolitano A, Bovée JVMG, Hjelle Å, Tang G, Spalek M, Nannini M, Swanson D, Baad-Hansen T, Sciot R, Hesla AC, Huang P, Dorleijn D, Haugland HK, Lacambra M, Skoczylas J, Pantaleo MA, Haas RL, **Meza-Zepeda LA,** Haller F, Czarnecka AM, Loong H, Jebsen NL, Sande M, Jones RL, Haglund F, Timmermans I, Safwat A, Bjerkehagen B, **Boye K** (2022)
  Validation of a novel risk score to predict early and late recurrence in solitary fibrous tumour
  Br J Cancer, 127 (10), 1793-1798

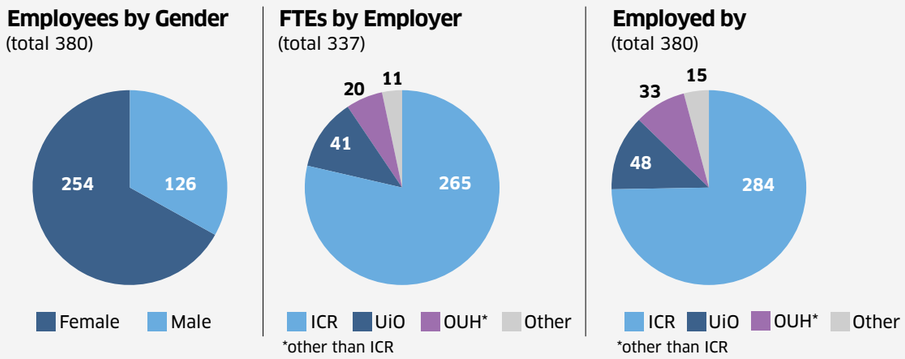
  Main finding: Development and validation of a new model for prediction of disease recurrence in the rare sarcoma subtype solitary fibrous tumor.

- **Salberg UB**, **Skingen VE**, **Fjeldbo CS**, **Hompland T**, **Ragnum HB**, Vlatkovic L, Hole KH, Seierstad T, **Lyng H** (2022)
  A prognostic hypoxia gene signature with low heterogeneity within the dominant tumour lesion in prostate cancer patients
  Br J Cancer, 127 (2), 321-328

  Main finding: Hypoxia gene signature shows low intratumor heterogeneity and predicts outcome of prostatectomy in multiple cohorts of prostate cancer patients.

The People





Prizes and Honors 2022

- Anders Jahre Award for Medical Research (Nordic prize) to Harald Stenmark
- Young Investigator Prize from Oncology Forum to Chloe B. Steen
- Ragnar Mørk's Legacy's Prize for excellent cancer research to Marina Vietri
- Institute for Cancer Research "Researcher of the year 2022" to Kushtrim Kryeziu
- Institute for Cancer Research "Employee of the year 2022" to Marit Osland Haugli
- Oslo University Hospital "Excellent article" prize to Muhammed Ali, Eirini Giannakopoulou & Johanna Olweus (Nat Biotechnol. 2022; 40:488-498 – epub 2021)

Completed PhDs 2022

Elin Aamdal
Cancer Immunology **
Treating metastatic melanoma with ipilimumab – Clinical activity, health-related quality of life and combination with a telomerase peptide vaccine

Christian Bergsland
Molecular Oncology
Fluorescence-based multiplex immunohistochemistry in precision medicine of colorectal cancer

Ina Andrassy Eilertsen
Molecular Oncology
Tumor heterogeneity of gene expression and alternative splicing in primary colorectal cancer: Tumor splicing burden and specific splicing events are prognostic factors in colorectal cancer

Zsofia Földvári
Cancer Immunology
Addressing challenges in TCR-based cancer immunotherapy

Eirini Gainnakopoulous
Cancer Immunology
Unleashing the power of T cell receptors for adoptive immunotherapy

Tatiana Georgiesh
Tumor Biology *
Solitary fibrous tumour. The role of clinical, histopathological and molecular factors in risk stratification and prognosis

Mariaserena Giliberto
Cancer Immunology
Application of drug sensitivity screening in B-cell malignancies for informing precision medicine strategies

Hedda von der Lippe Gythfeldt
Cancer Genetics
Identifying molecular factors responsible for treatment response and resistance in a breast cancer study and a breast cancer model

Maren Høland
Molecular Oncology
Molecular and clinical risk classification of malignant peripheral nerve sheath tumors

Ruth Gong Li
Radiation Biology
Development and Evaluation of α-emitting $CaCO_3$-based Radiotherapeutics Against Intracavitary Micrometastases

Abhilash D. Pandya
Tumor Biology
Nanoparticles in Targeted Cancer Therapy

Idun Dale Rein
Radiation Biology/Core Facilities
Investigating functional phenotypes of PARP inhibitor treatment by advanced flow cytometry

Hélène Spangenberg
Molecular Cell Biology
Cellular mechanisms of vesicle generation and closure

Jonas Meier Strømme
Molecular Oncology
Computational analyses of transcriptomic alterations in prostate and colorectal cancers

* Co hosted by Department of Pathology
** Co hosted by Department of Oncology

The People

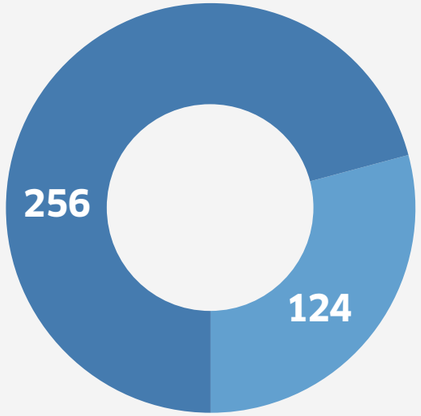
International Staff Distribution

124

PEOPLE IN TOTAL FROM OUTSIDE NORWAY

33

NATIONS ARE REPRESENTED



- Norwegian: **256 (67%)***
- International: **124 (33%)**

*Including naturalised foreigners

01

Countries represented by one person

Chile
Colombia
Czech Republic
Denmark
Egypt
Macedonia
Netherlands
Pakistan
Peru
Serbia
Slovakia
Switzerland

02

People

Australia
Croatia
Finland
Lebanon
Portugal
Russia
USA

04

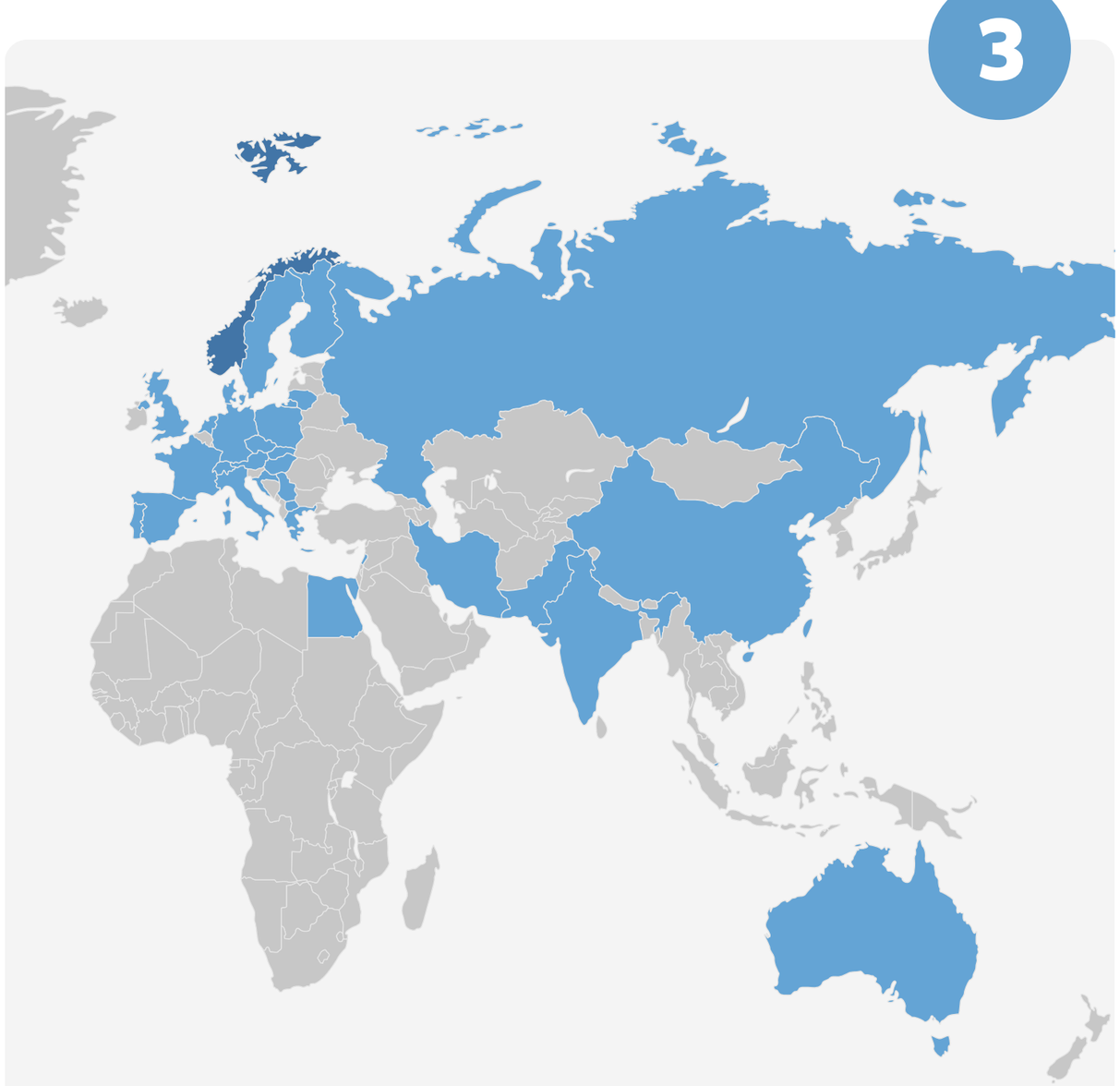
People

Austria
Great Britain
Hungary
Iran

05

People

Lithuania
Poland



06

People

France
Greece

08

People

Italy
Spain

09

People

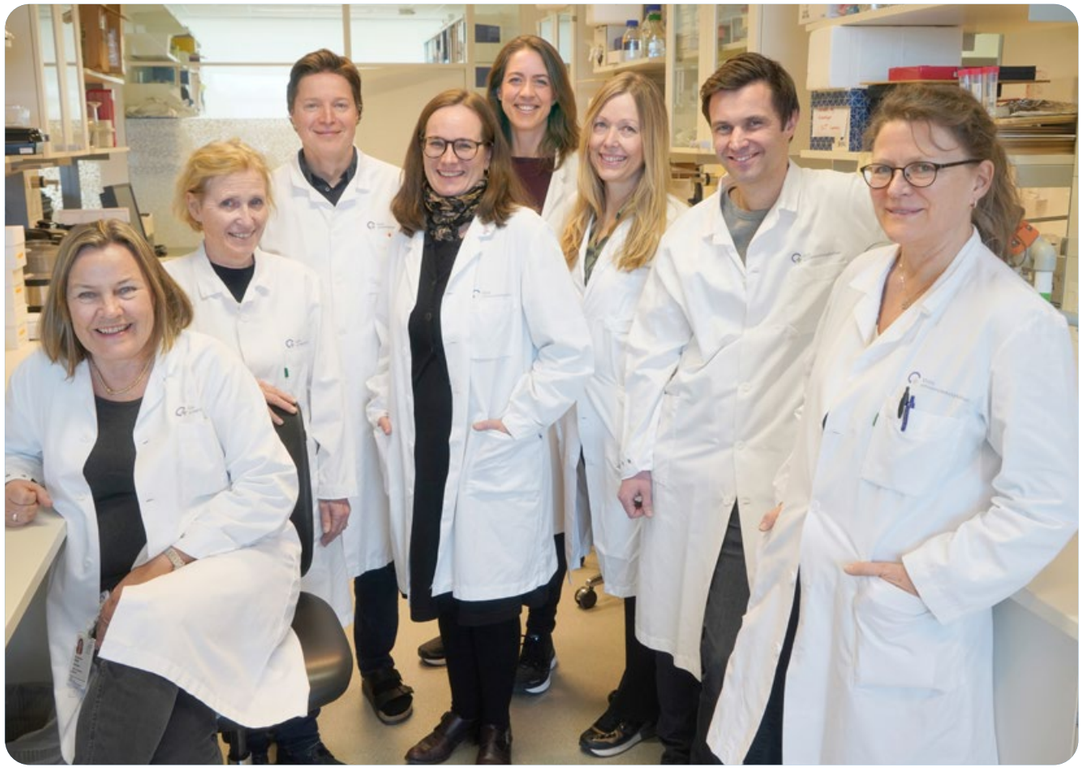
India
Sweeden

13

People

China
Germany

Department of Cancer Genetics



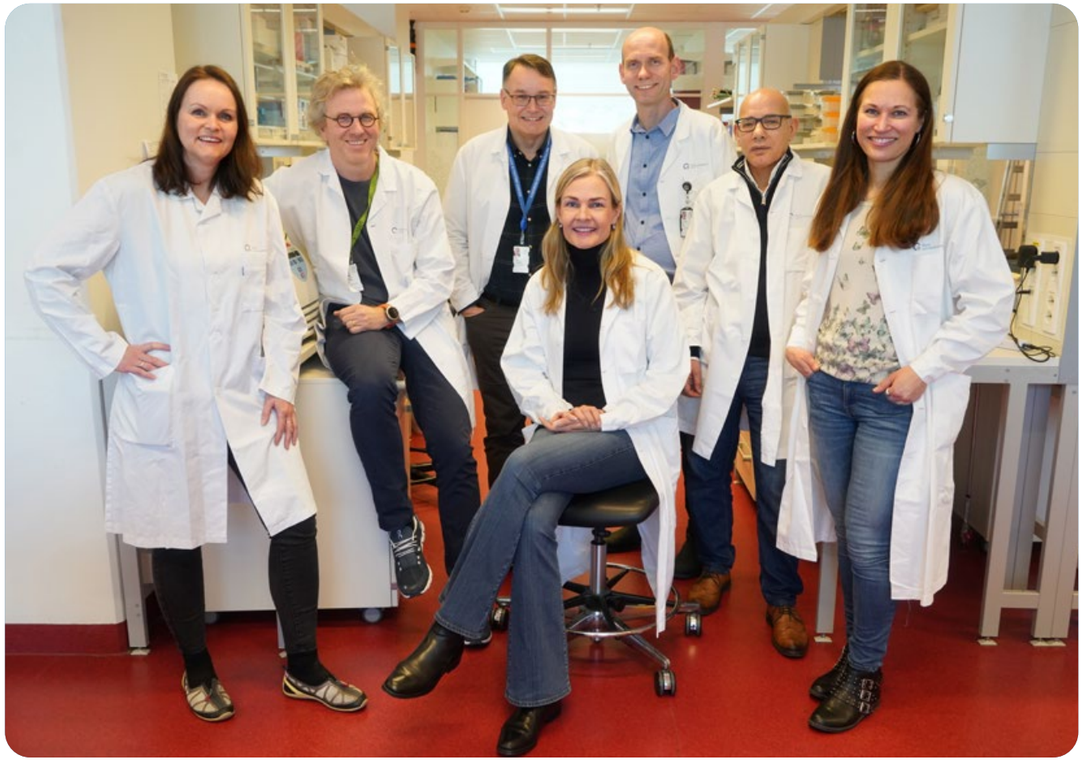
Gry Aarum Geitvik, Elin Kure, Tero Aittokallio, Hege E. G. Russnes, Vilde Drageset Haakensen, Therese Sørlie, Thomas Fleischer, Åslaug Helland

Head of Department: Therese Sørlie / Employees: 55

Breast Tumor Initiation Therese Sørlie	Computational Systems Medicine in Cancer Tero Aittokallio	Lab Technology Gry Aarum Geitvik	Translational Studies on Solid Tumors Åslaug Helland	Molecular Biology of Breast Cancer 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 work to reduce risk, improve early diagnosis and prognosis, and tailor treatment for cancer patients through integrated molecular and clinical studies.
- We published 56 scientific articles in 2022
- Two new grants from Norwegian Cancer Society (V Haakensen, H Russnes)
- Leading roles in the lung cancer trials DART, NIPU and COM-IT-2 and the breast cancer trials EMIT, I-BCT and NAPEER+
- IMPRESS-Norway- a national prospective precision cancer medicine study has included 700 patients into molecular screening (PI, Å Helland and management team, H Russnes)
- We biobanked biological samples from more than 1000 patients (>5000 tubes of tissue, PMBC, plasma, serum, single cells)
- Opening of MATRIX- a national centre for clinical cancer research - funded with 128 mill. NOK (PI, Å Helland)
- Part of RCN Centre of Excellence “Integreat – The Norwegian centre for knowledge-driven machine learning” together with UiO and UiT (PI, T Aittokallio)
- WP leaders in the EU-project PCM4EU (PIs, H Russnes and Å Helland)
- WP leader in PANCAIM, ongoing Horizon 2020 project (T Aittokallio and E Kure)

Department of Cancer Immunology



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

Head of Department: Johanna Olweus / Employees: 75

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

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

- The Research Council of Norway awarded the Precision Immunotherapy Alliance – PRIMA –Center of Excellence, launching 2023 (p13). Directors and 3/7 consortium groups at the department
- Four PhD-graduations, 33 publications with 66% first and/or last/corresponding authors from the department, and with median/mean impact factor of 7/16
- Kyte group published an article in Nature Medicine showing improved progression-free survival in breast cancer patients when combining chemotherapy with immunotherapy
- Skånland project group published article in Clinical Cancer Research on PIK3 inhibitors that are still efficacious in CLL patients resistant to Idelalisib
- Taskén first author on correspondence in Nature Medicine describing the national precision cancer medicine implementation initiative for Norway
- Chloe B. Steen (Myklebust group) awarded Young Investigator Prize from Oncology Forum
- Olweus group partner on granted EU HORIZON-HLTH-2021 Research and Innovation project geneTIGA, launched in 2022 (https://www.genetiga-horizon.eu/news/)
- A 6-mill EUR grant from the European Commission Cancer Mission program was awarded to the PRIME-ROSE consortium for precision medicine implementation, led by Kjetil Taskén

Department of Molecular Cell Biology

Kaisa Haglund, Kirsten Sandvig, Camilla Raiborg, Harald A. Stenmark, Antoni Wiedlocha, Kay Oliver Schink, Marina Vietri, Alf Håkon Lystad, Tor Erik Rusten, Alicia Martinez Llorente, Tore-Geir Iversen. Absent: Jorrit Enserink, Andreas Brech, Helene Knævelsrud

Head of Department: Harald A. Stenmark / Employees: 78

Cellular Membrane Dynamics
Harald A. Stenmark

Unit of Cellular Electron Microscopy Andreas Brech

Cytokinesis in Development and Carcinogenesis Kaisa Haglund

Autophagy and Related Pathways Alf Håkon Lystad

Protein Dynamics in Tumor Suppressor Pathways Camilla Raiborg

Phosphoinositide Control of Early Endocytic Trafficking Kay Oliver Schink

Membrane Dynamics in Tumorigenesis Marina Vietri

Protein Internalisation and Signaling Antoni Wiedlocha

Cancer Molecular Medicine
Jorrit Enserink

Mapping and Disrupting Cancer Circuits
Helene Knævelsrud

Tumor-Host Biology
Tor Erik Rusten

Intracellular Transport
Kirsten Sandvig

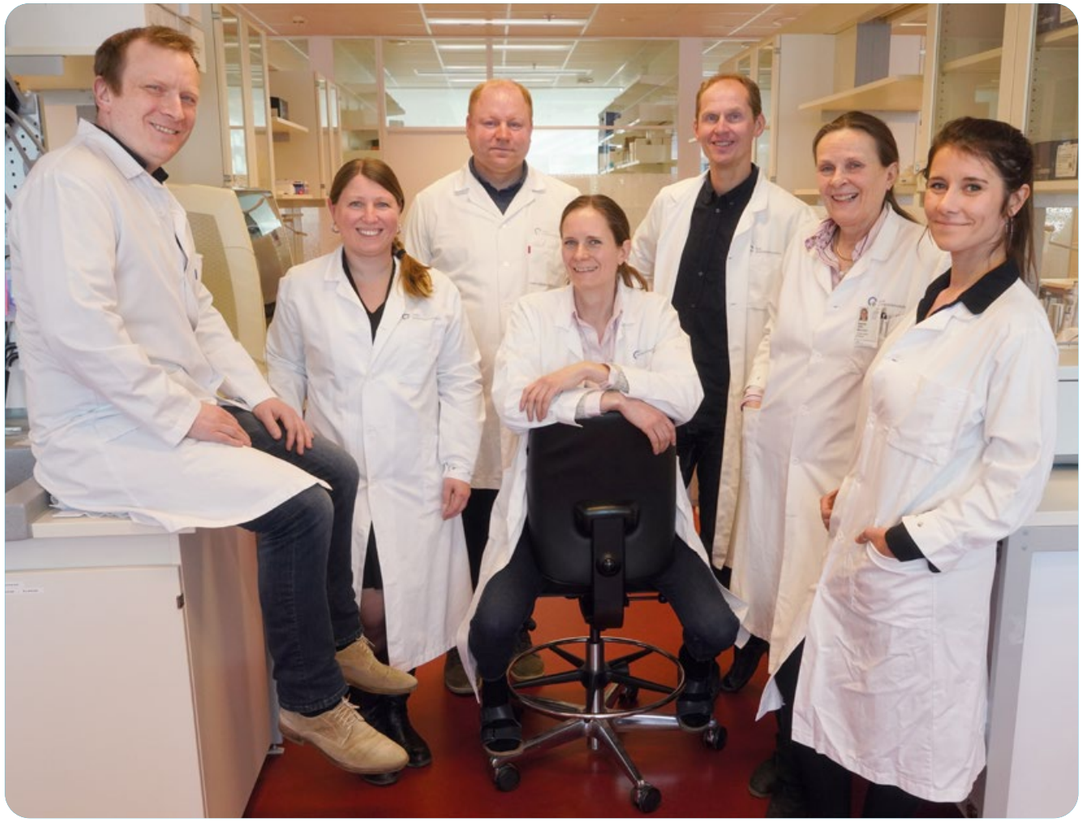
Nanoparticles in Biomedicine: In Vitro Studies
Tore-Geir Iversen

Exosomes and Prostate Cancer
Alicia Martinez Llorente

- ERC Starting Grant to Helene Knævelsrud
- RCN Young Talents Grant to Marina Vietri
- Major project grants to Tor Erik Rusten, Camilla Raiborg and Alicia Llorente
- PhD degree to Hélène Spangenberg in April 2022
- 35 papers in 2022, including papers in EMBO Journal, Trends in Immunology, Nucleic Acids Research, Journal of Cell Biology, PNAS, and European Urology
- Dr. Ragnar Mørk's Prize for Excellent Cancer Research 2022 to Marina Vietri

"Uncovering the cellular basis of cancer development"

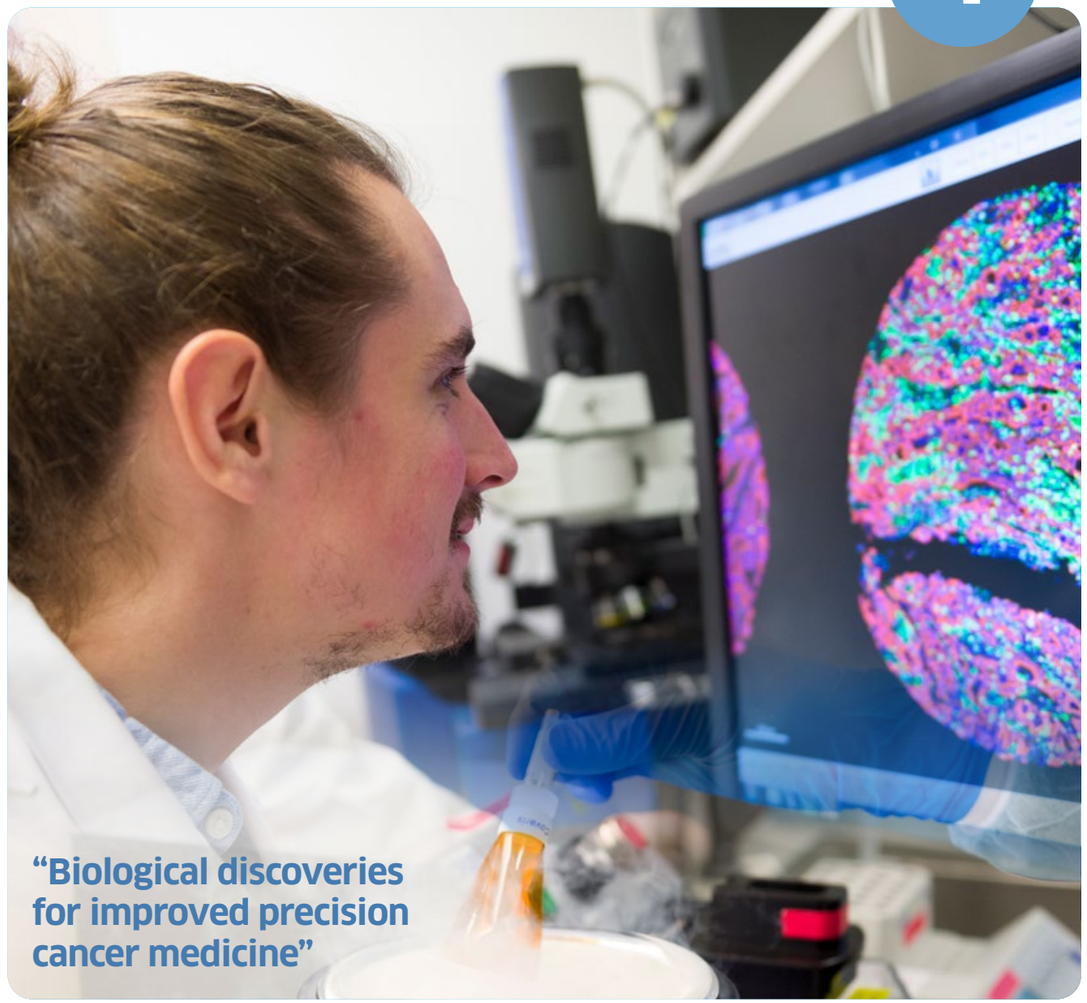
Department of Molecular Oncology



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

Head of Department: Ragnhild A. Lothe / Employees: 42

Genetics Ragnhild A. Lothe	Epigenetics Guro E. Lind	Genome Biology Rolf I. Skotheim
Cell Signalling Edward Leithe **Computational Oncology** Anita Sveen	**Statistical Epigenomics** Marine Jeanmougin	**Cancer Informatics** Bjarne Johannessen



“Biological discoveries for improved precision cancer medicine”

- Our 42 employees (30 full-time) published 19 original articles indexed on PubMed in 2022, half with first and last authorships.
- Three major international collaborative studies published on urological cancers. The prostate cancer team published two invited “words of wisdom” in Eur Urol.
- The EVIDENT trial: ex vivo drug sensitivity in metastatic colorectal cancer was opened in March, and interventions are approved for 23 drugs and combinations
- The national surveillance study of bladder cancer recurrence included patient no 450. Interim analyses of urine samples monitored using our BladMetrix methylation test confirms its accuracy
- Six department members successfully defended their academic degrees (4 PhD and 2 MSc)
- Kushtrim Kryeziu was awarded “Researcher of the year” at the Institute. His tumor organoid research was fronted on the cover of BBA Rev Cancer for 2022.
- Invited presentations at five influential international conferences, including the AACR Colorectal Cancer conference, Portland, Orgeon (Anita Sveen). Rolf Skotheim co-organized the Norwegian Cancer Symposium 2022

Department of Radiaton Biology

Asta Juzeniene, Kristian Berg, Anette Weyergang, Sebastian Patzke, Randi Syljuåsen, Pål Kristian Selbo, Heidi Lyng, Absent: Theodossis A. Theodossiou, Beata Grallert, Trond Stokke

Head of Department: Kristian Berg / Employees: 41

Photochemical Internalization
Kristian Berg

Light-Controlled Delivery of Cancer Immunotherapeutics
Pål Kristian Selbo

Protonics
Theodossis A. Theodossiou

Recombinant Light Activated Therapeutics
Anette Weyergang

Targeted Alpha Therapy
Asta Juzeniene

Clinical Radiation Biology
Heidi Lyng

Radiation Biology and DNA Damage Signaling
Randi Syljuåsen

Regulation of Translation in Cell Cycle and Stress
Beata Grallert

Centrosome and Cell Division Cycle
Sebastian Patzke

The Molecular Radiation Biology group
Trond Stokke

4

“Our goal is to develop new predictive methods and treatment strategies for improved radiation therapy”

- Asta Juzeniene appointed as new group leader in the department with focus on targeted alpha-particle emitting radionuclide therapies
- Novel method to study DNA damage-induced effects on RNA polymerase II (Nucl. Acids Res., Bay/ Syljuåsen/ Landsverk)
- Antitumor immune signaling after irradiation and ATR inhibition reported (Front Oncol., Eek Mariampillai/ Syljuåsen)
- Grant from the South-Eastern Norway Regional Health Authority to Tord Hompland (Lyng)
- Grant from the Bothner’s legacy for a collaboration project with Institut Curie, France on “GRID-therapy with protons” (Lyng and Malinen).
- New radiotherapy resistance mechanism in cervical cancer identified (Nilsen et al. Lyng, Mol Oncology)
- Partner in EEA-funding (Portugal –Norway) with Prof. Faustino, Univ. of Aveiro (Pål K.Selbo)
- Biomarker project admitted to the OCC incubator accelerator program (Weyergang, (patent granted in US and Japan))
- A postdoc (Health South-East) and an Innovation Seed grant (UiO Growth House) on development of a targeted toxin and an Innovation grant (Health South-East) on development of a diagnostic tool (Weyergang)

Department of Tumor Biology

Eivind Hovig, Alfonso Urbanucci, Lina Prasmickaite, Jørgen Wesche, Kjersti Flatmark, Leonardo A. Meza-Zepeda, Kristin A. Taskén, Mads H. Haugen, Gunhild M. Mælandsmo. Absent: Nikolai Engedal

Head of Department Gunhild M. Mælandsmo / Employees: 62

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

Computational Cancer Genomics
Eivind Hovig

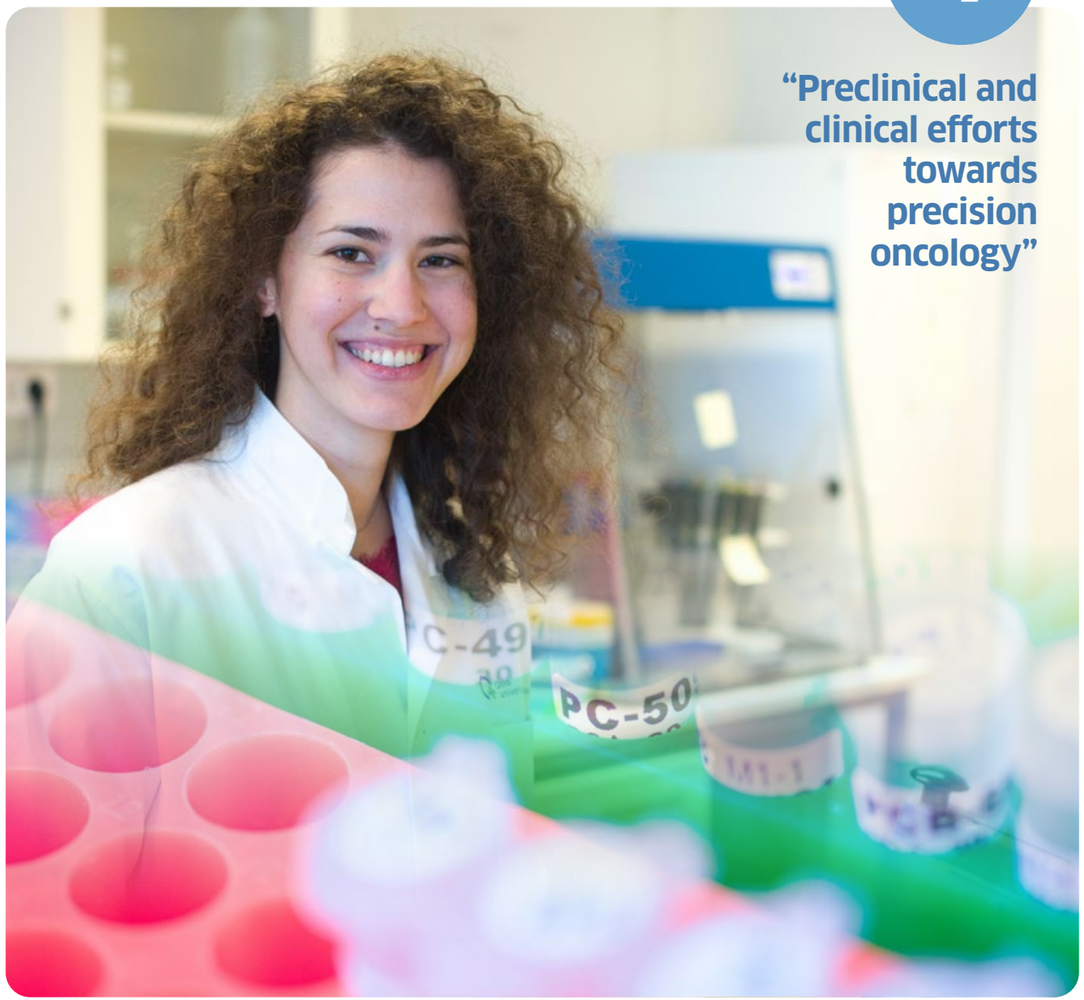
Autophagy in Cancer
Nikolai Engedal

Molecular Medicine of Cancer
Alfonso Urbanucci

Molecular Biology of Sarcomas
Jørgen Wesche

Translational Genomics
Leonardo A. Meza-Zepeda

4



“Preclinical and clinical efforts towards precision oncology”

- New clinical studies to evaluate:
  - protein signatures for stratification of breast cancer patients
  - beta-blocker use in prostate cancer surgery
- New funding for clinical studies:
  - FGFR-inhibitors in liposarcoma immunotherapy
  - Pseudovax – vaccination protocol for GNAS-mutated pseudomyxoma peritonei
- Start-up funding for a young investigator in cancer nanomedicine
- Leading role in bioinformatics in national initiative for precision medicine
- 56 publications of which half as first or last author, 3 PhDs and 5 Master degrees

Department of Core Facilities

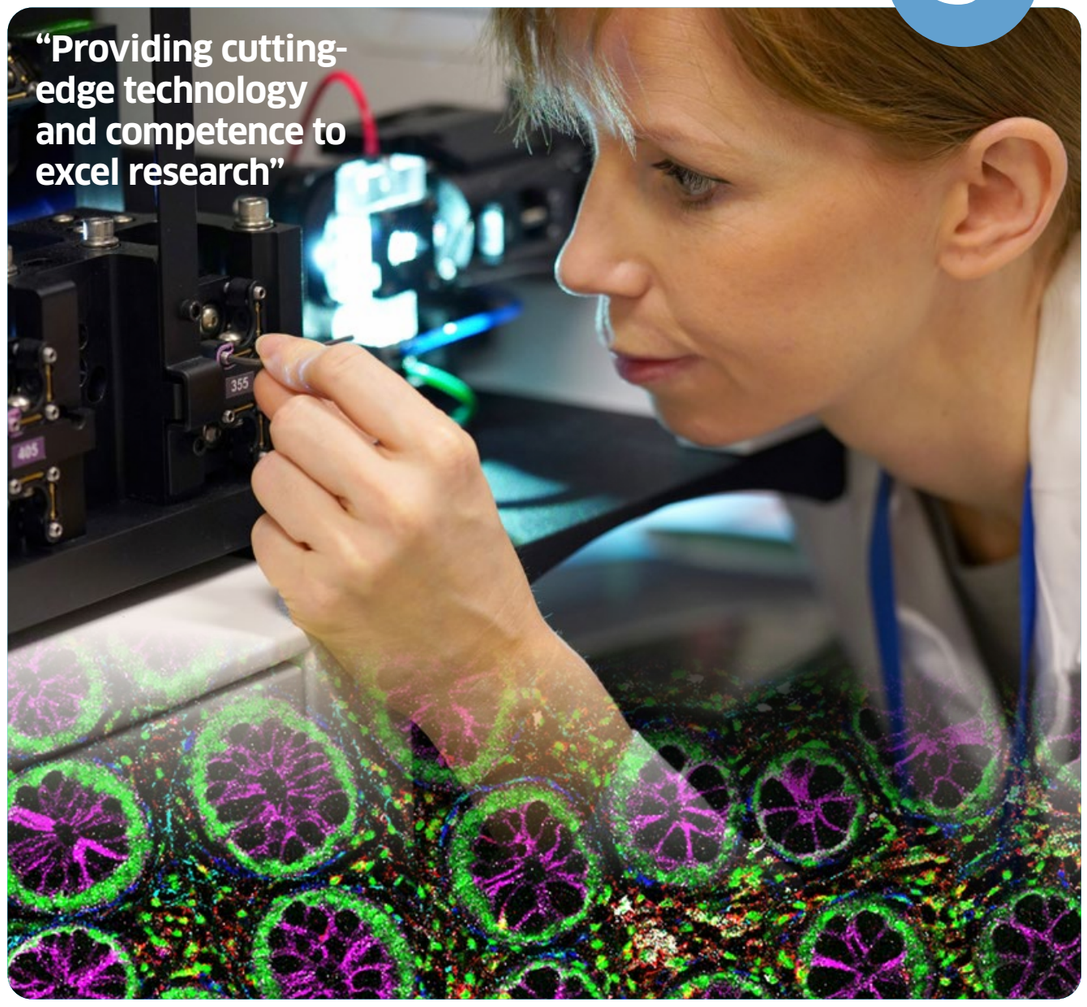
Trond Stokke, Susanne Lorenz, Ellen Skarpen, Leonardo A. Meza-Zepeda

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

Genomics and Bioinformatics
Susanne Lorenz

Advanced Light and Electron Microscopies
Ellen Skarpen

Flow Cytometry and Preclinical Imaging
Trond Stokke retired 30.11
Idun Dale Rein from 1.12.



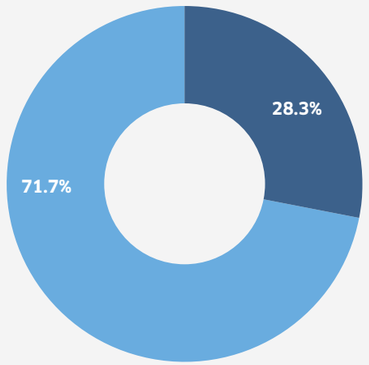
- The Advanced Microscopy unit is a key partner in a funded Research Council of Norway interdisciplinary grant
- The Advanced Electron Microscopy Facility has implemented STEM-tomography for 3D-imaging of large cellular structures
- Funding for a state-of-the-art, full-spectrum cell sorter and analyser was obtained by the Flow Cytometry Core Facility from Norsk Hydros Fond and Oslo University Hospital and with support from CoE PRIMA
- Procurement of a state-of-the-art preclinical MR machine that will support small animal research in the new proton therapy centre
- The Genomics Core Facility has upgraded the single-cell infrastructure with a new Chromium X controller, which expands our multi-omics services
- The Genomics Facility has extended the service for spatial transcriptomics using the 10x Genomics Visium platform and our new CytAssist instrument
- The Bioinformatics Core Facility has built an extended repertoire of services for single-cell analysis
- A new service for analysis of drug sensitivity screens was established in collaboration with the Chemical Biology Platform at the Centre for Molecular Medicine Norway at UiO

The Funding

The Institute researchers received a total of >350 mill NOK in new incoming grants (to start 2023) from external sources in 2022.

THIS INCLUDED:

- 155 mill NOK from the Research Council of Norway to a new centre of excellence “The PRecision IMmunotherapy Alliance (PRIMA)” led by Karl-Johan Malmberg and Johanna Olweus
- Eight new grants from the Norwegian Cancer Society, nine (research and innovation) from the Regional Health Authority for South-Eastern Norway, one from the National Clinical Trials Programme (KLINBEFORSK), one from RadForsk (to the TARACAN project), four grants from the Research Council of Norway, and three new EU grants. The European precision cancer medicine consortium that runs DRUP-like trials such as IMPRESS won EU grants both under the EU4Health – Europe Beating Cancer programme (POCM4EU) and in the Horizon Europe Cancer Mission programme (PRIME-ROSE).

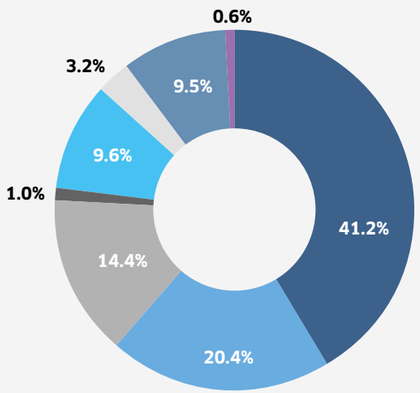


Funding in 2022

Percent

Actual Institute expenditure for 2022 by internal and external funding sources (total 388,4 MNOK = approx. 36,3 M€)

- Internal funding
- External funding

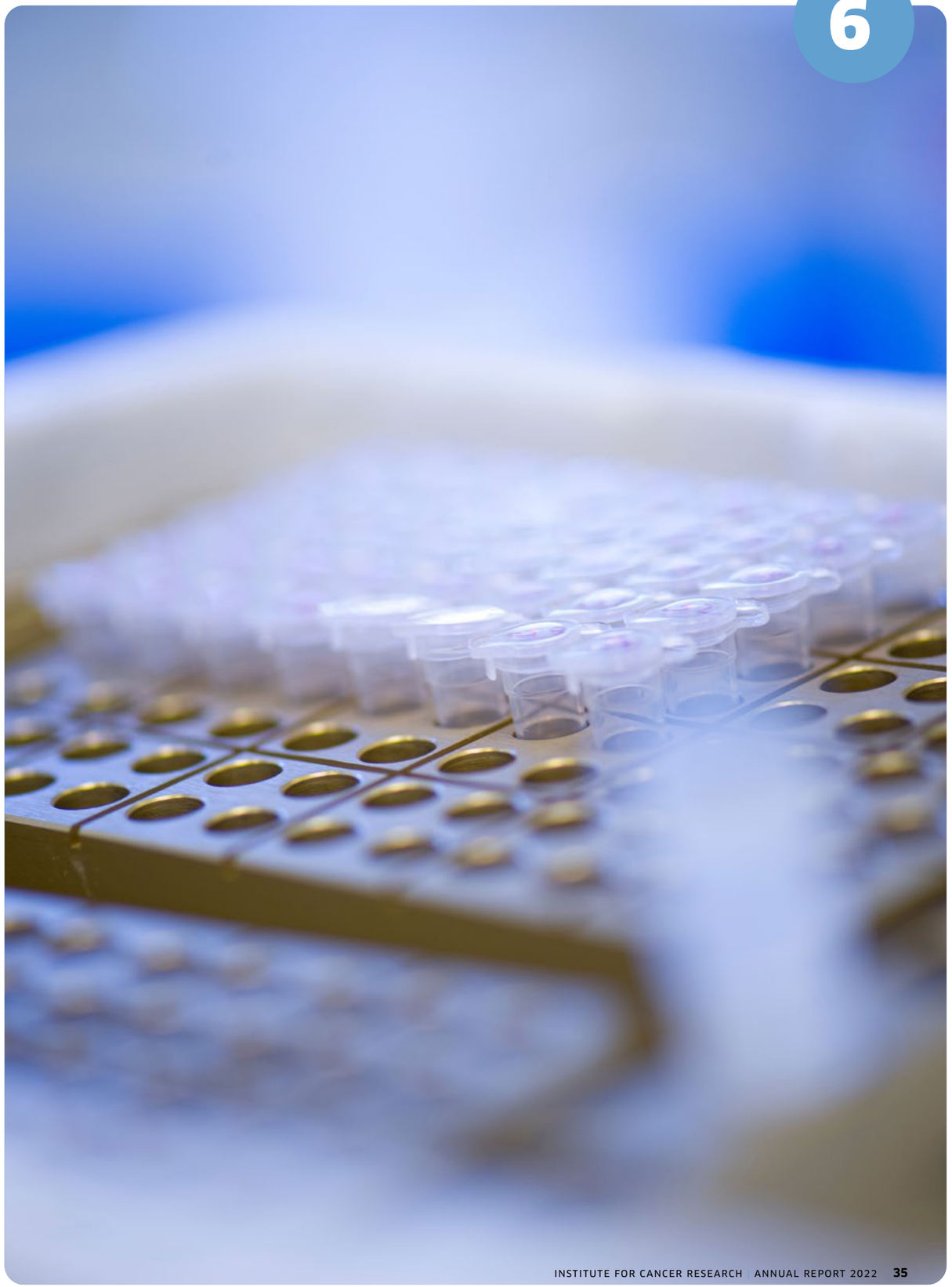


External funding by source

Percent

Sources of external competitive funding for 2022, based on actual expenditure (total 278,6 MNOK= approx. 26,1 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
- Other public sources



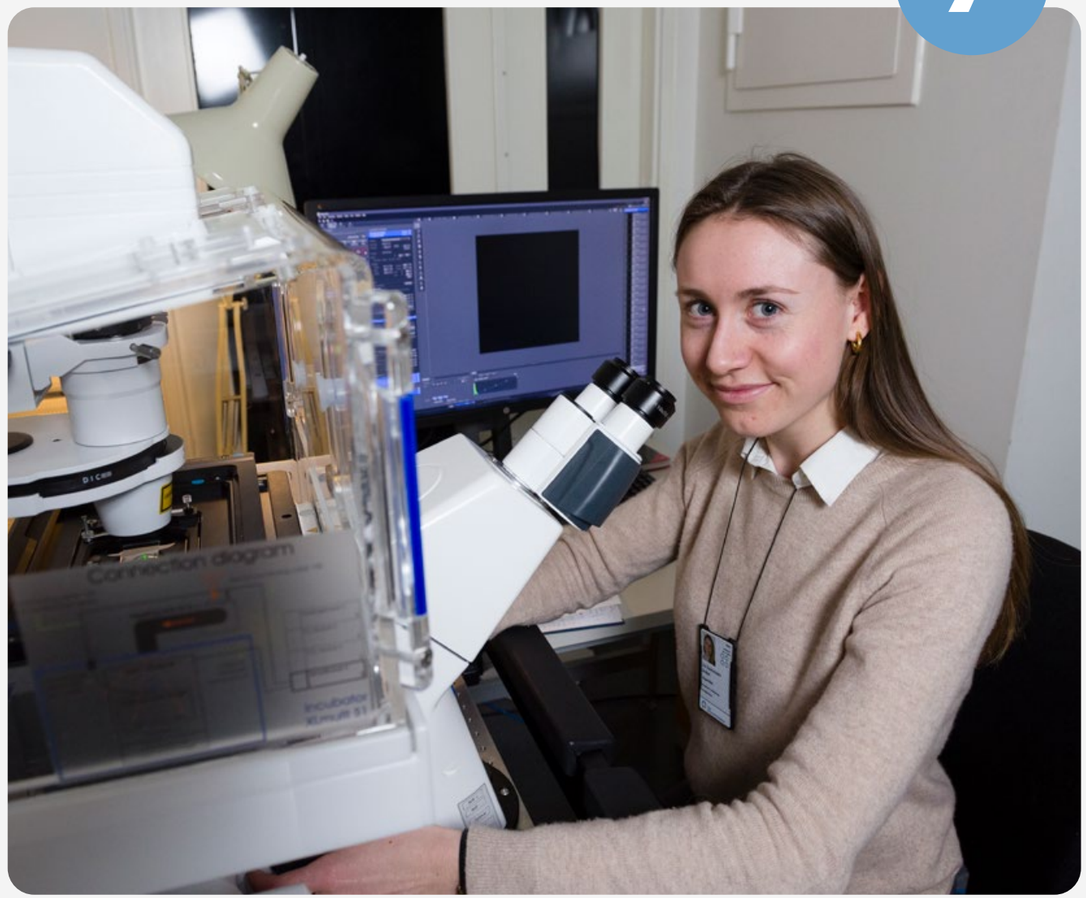
The Centres

MATRIX
NORWEGIAN CENTRE FOR CLINICAL CANCER RESEARCH

MATRIX – Norwegian Centre for Clinical Cancer Research

Headed by Director Åslaug Helland, Co-Director Stein Kaasa
Centre for Clinical Treatment Research (FKB), hosted by OUH, Division of Cancer Medicine / ICR

- MATRIX officially opened in August 2022, and the over-all ambition of this national Centre is to help patients with hard-to-treat cancers to live longer with better quality of life.
- MATRIX has partners and study sites across Norway, and altogether fifteen hospitals with cancer departments as well as the University of Oslo and OsloMet are partners.
- MATRIX will develop next-generation precision diagnostics and treatment, facilitate advanced clinical trials as well as develop and implement digital patient-centred pathways that secure treatment and follow-up tailored to the individual patient, and the Centre is intimately linked to activities at the ICR.
- A Clinical Trial Engine is established for handling regulatory, logistical and clinical needs across Norway, and MATRIX will in addition contribute to training of study personnel.
- MATRIX develops and tests new treatment strategies in clinical trials with an aim to contribute to an increased number of studies in Norway within precision medicine, patient-centred care as well as within cell therapy, also in early lines of treatment.



Centre for Cancer Cell Reprogramming (CanCell)

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

REPROGRAMMING CANCER
OMPROGRAMMERING AV KREFT

- Project leaders Helene Knævelsrud and Kay O. Schink obtained Associate Professorships at University of Oslo
- Collaborative papers published in journals such as *Nature Communications, EMBO Journal, and British Journal of Cancer*
- Funding from the Research Council extended until 31.12.2028

“Reprogramming of cancer”

The Centres

ACT (Centre for Advanced Cell and Gene Therapy)

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

- Recruited Dr Anna Pasetto as Center Director and established a single-point-of-entry procedure with transparent review of new projects
- Acquired new equipment to support cell isolation, expansion and gene editing under full GMP
- Currently 7 ongoing projects, including innovative cell therapy approaches based on expanded NK cells, genetically engineered T cells and pancreatic islet cells

"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 running trials in B-cell malignancies: Of twenty-six ongoing trials, several are testing new immunotherapy treatments
- Strong focus on functional precision medicine: Five original and seven review papers published including Nat Med, Blood and Clin Cancer Res
- Key discoveries related to COVID-19 pandemic - SARS-CoV-2 vaccine responses in cancer patients receiving immunosuppressive therapies

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

Stiftelsen KGJ Kristian Gerhard Jebsen Foundation

Strategic Research Area in Cell and Gene Therapy (StratCell)

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

- Upscaled blue-print protocol for genetically engineered cytotoxic T cells expressing a therapeutic immune receptor in a fully automated system, supported by Trond Mohn-Stiftelsen grant, and
- Developed regulatory document package aided by regulatory consultants to transfer competence to the ACT center, in close collaboration with ACT.
- Reported the pre-clinical development of a new TdT-specific TCR-T cell therapy against acute lymphoblastic leukemia (*Ali et al*, **Nature Biotechnology, 2022 -** epub 2021).

"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

- TEAM-ACT published 12 articles, received 6 open call grants and were invited speakers at 8 major international conferences
- Patients included in our ex vivo pharmacogenomics studies showed benefit from experimental treatment guided by drug sensitivity testing
- A unique multi-omics dataset of patients (n=50) treated by liver transplantation for metastatic colorectal cancer indicates potential for prediction of long-term survivors after transplantation

"New treatment strategies of colorectal cancer"

The Clinic

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

Oslo University Hospital, a Comprehensive Cancer Centre since 2017, 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 corner stone in our OECI-accredited Comprehensive Cancer Centre (CCC). The importance of the CCC structure and integration of research and care is more recognized than ever within EU for quality of cancer care and access to a CCC or CCC-network should be offered to all cancer patients in Europe within 2030. The Institute is situated in close proximity to clinical cancer departments and diagnostic laboratories at the Radium Hospital, a cancer-oriented part of Oslo University Hospital and with Oslo Cancer Cluster and the Cancer Registry of Norway as neighbours. The opening of the new clinical building and the proton centre at the Radium Hospital next year will strengthen the already unique concept.

More patients into clinical trials is an expressed aim for the CCC, and a number of 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 in Oslo University Hospital is an important factor to instigate and improve investigator-initiated clinical trials, by delivering new methodologies for patient stratification and including high quality translational research connected to trials. The Institute for the last years has been able to reach out to more cancer groups and today we together cover all the common cancers.

The extensive international collaboration involving researchers at ICR is also an important asset for the CCC. In the integrated organisation 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 the Europe's Beating Cancer Plan

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

Translation and Innovation at the ICR

Since 2019 the ICR has aimed to strengthen our translational research as well as collaboration, coordination and cohesion with clinical and diagnostic environments in OUH CCC. From 2020 we established the Translational Research and Innovation Committee (TRIC) that meets every month and from 2021 we instigated and started planning 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 research in specific areas.

The ICR is the institute that delivers the most DOFIs and patent applications across OUH and UiO according to our technology transfer office, Inven2. Over the past 2.5 years, the TRIC has reviewed some 50 translation and innovation projects originating from the Institute and met with many of their collaboration partners. 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. A recent survey shows that TRIC largely functions according to intent.

ICR translation and innovation are funded and developing through collaborations with the UiO Growth House, the UiO/OUH SPARK programme, Inven2 and 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 Triple-negative Breast Cancer
  ClinicalTrials.gov #: NCT03164993
  PI: Jon Amund Kyte, partner labs.: J.A. Kyte, Hege Russnes

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

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

- ComIT - Combinatory ImmunoTherapy-1
  ClinicalTrials.gov #: NCT03644823
  PI: Åslaug Helland, partner lab.: Åslaug Helland

- COM-IT-2 trial
  EUDRACT#: 2021-003266
  PI: Vilde Haakensen
  Partner lab: St. Olavs hospital

- 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 in metastatic colorectal cancer.
  EudraCT #: 2020-003395-41.
  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 lab: Kyrre Eeg Emblem, Åslaug Helland/Vilde D Haakensen

- IMPRESS-Norway – Improving public cancer care by implementing precision medicine in Norway
  ClinicalTrial.gov #: NCT04817956; https://impress-norway.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: Live Fagereng.

- LD-VenEx - Phase II "feasibility" study of azacitidine in combination with low dose venetoclax in patients with acute myeloid leukemiaEudraCT #: 2020-005461-14
  PI: The Nordic AML Group, partner lab: Jorrit Enserink

- METIMMOX; Colorectal Cancer METastasis - Shaping Anti-tumor IMMunity by OXaliplatin
  ClinicalTrials.gov#: NCT03388190
  PI: Anne Hansen Ree (AHUS), partner lab: Kjersti Flatmark

- METIMMOX-2: Metastatic pMMR/MSS Colorectal Cancer - Shaping Anti-Tumor Immunity by Oxaliplatin
  NCT#: 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

- Microbiota Transplant to Cancer Patients Who Have Failed Immunotherapy Using Faeces From Clinical Responders (MITRIC)
  ClinicalTrials.gov Identifier: NCT0528629
  PI: Jon Amund Kyte
  Lab partner: Jon Amund Kyte

- NeoAdjuvant PErsonalized therapy in Estrogen Receptor positive (+) breast cancer (NAPEER+)
  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 (AGK), 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

- Perioperative Propranolol in Robotic Assisted Laparoscopic Prostatectomy - A Pilot Study
  EudraCT#: 2022-001184-28 / NCT05679193
  PI: Shivanthe Sivanesan
  Partner lab: 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 165 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

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
- 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 2022

Namrita Kaur

Postdoctor

Namrita has previously worked at the University of Manchester with mice and cardiomyocytes on the topic of diabetes and cardiomyopathy. Now she has joined Alf Håkon Lystad´s project group to work on non-canonical autophagy and membrane stress pathways. Member of the Stenmark group, Cellular Membrane Dynamics Department of Molecular Cell Biology

Helene Midtun Flatekvål

Special engineer

Helene has a master degree in Biotechnology from NTNU. She has broad experience in in vitro lab experiments, including 3D cultures and genome editing assays. Member of the Geitvik group, Lab Technology Department of Cancer Genetics

Monica H. Solbakken

Special engineer

Monica H. Solbakken, PhD has a background in evolutionary biology and brings competence in long-read and RNA-seq analysis to unravel alternative immune strategies in animals. Member of the Lorenz group, Genomics and Bioinformatics Department of Core Facilities

Mickael Gries

Postdoctor

Michael Gries has a PhD from Université de Lorraine in Nancy, France; on orthotopic glioblastoma models and impact of polarized macrophages on treatment outcome. He will utilize his expertise in ionizing and non-ionizing treatment strategies. Member of the Berg group, Photochemical Internalization Department of Radiation Biology

Ingrid Vikan Sjurgard

PhD student

Ingrid will be working with molecular- and immuno-profiling of esophageal adenocarcinoma in collaboration with the NORECa - The Norwegian Esophageal Cancer Consortium. Member of the Lind group, Epigenetics Department of Molecular Oncology

Birgitte Bjørnerud

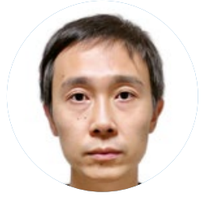
Research assistant

Birgitte brings her competence in live-cell imaging and automatic analysis of cell movement to a project focusing on metastasis of the childhood cancer rhabdomyosarcoma. Member of the Wesche group, Molecular Biology of Sarcomas, Department of Tumor Biology

Youxian Li

Postdoctor

Youxian has a PhD in inflammation research from NTNU and did his first postdoc at RIKEN and Dept of Microbiology and Immunology, Keio University, Tokyo, Japan where he studied the gut microbiome and the role of trypsin degrading commensals in gut homeostasis and protection from pathogenic invasion (1st author Nature paper published fall 2022). Member of the Taskén group, Cell Signaling and Immune Regulation Department of Cancer Immunology



Institute training and career development

The ICR had some 62 PhD students and 59 postdocs employed in 2022, and 15 MSc students graduated. We provide student (MSc, PhD) and Postdoc mentoring and training. Our researcher track includes advancement levels to Scientist and Senior Scientist (110 scientist total), and we have 30 Project Group Leaders in addition to Group Leaders. For Engineers (96 total), advancement levels are to Head Engineer.

The ICR has participated (R.A. Lothe) in work to develop a **OUH Career Assessment Matrix** (OUH-CAM) built on NOR-CAM for universities and The Open Science Career Evaluation Matrix, that provides basis and guidance for **career development** for different categories of staff.

Internally, the **ICR Postdoc forum** and **ICR PhD forum** organise talks and serve as meeting places across our departments for students and postdocs.

Our trainees at different levels also benefit from and our staff members contribute to teaching and mentoring in the UiO PhD programmes, the UiO Faculty of Medicine Postdoc Career Dev Programme, the School of Health Innovation and SPARK programme and various research leadership training programmes. See also page 11 on our Career Development Programme.

“We are advancing a career development program that incorporates focus on project leaders as a resource, on mentorship, and scientific mobility.”

The Communication is Key

We published more than 210 peer-reviewed original, scientific papers in 2022 which is an important part of knowledge-generation. In addition, ICR members were also active in public outreach.

The ICR organized a number of scientific and popular meetings nationally and internationally, and we gave scientific talks in national fora and at international meetings, symposia and institutional seminars. Our researchers also disseminated knowledge in popular talks, interviews, newspaper correspondence, viewpoints and debate articles. We also communicated our science in almost 1500 original postings in social media (Twitter, LinkedIn etc).

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

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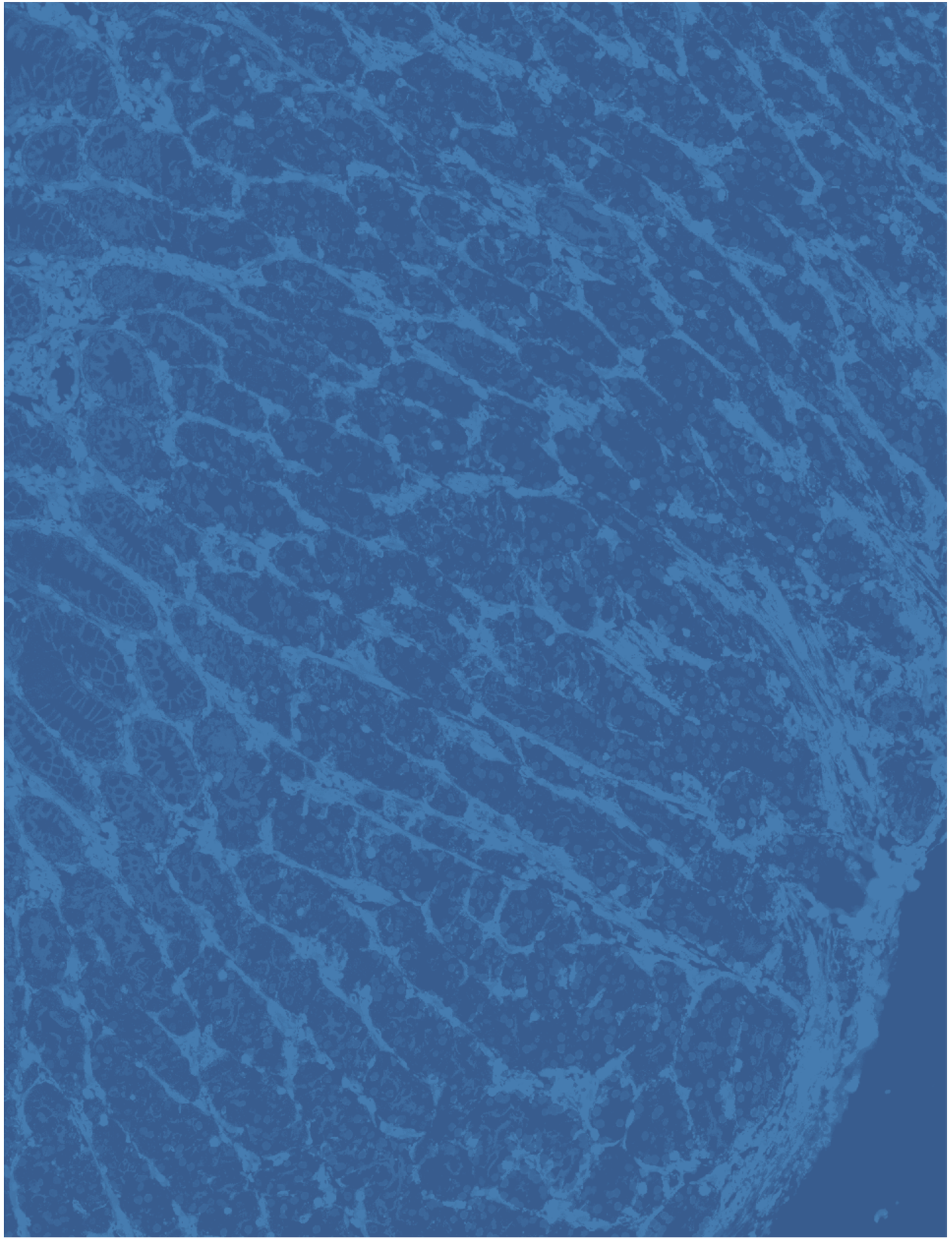

Oslo University Hospital
The Norwegian Radium Hospital
Institute for Cancer Research

Ullernchausseen 70
N-0379 Oslo
Norway

P.O. BOX 4953 Nydalen
N-0424 Oslo
Norway

http://ous-research.no/institute/