Oslo University Hospital

UiO : University of Oslo

Norwegian PSC Research Center

ANNUAL REPORT 2025

NOPSC

Visit the NoPSC web pages: *www.ous-research.no/nopsc and www.med.uio.no/klinmed/english/research/centres/nopsc/index.html*

Norwegian Primary Sclerosing Cholangitis Research Center (NoPSC)

ANNUAL REPORT 2025

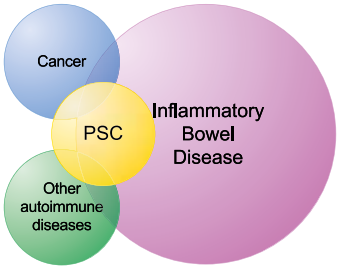
What is PSC?

Primary Sclerosing Cholangitis (PSC) belongs to the group of autoimmune liver diseases.

PSC is a chronic inflammatory disorder of the bile ducts, that leads to progressive strictures of the bile ducts and ultimately to liver cirrhosis.

PSC is more common in Northern Europe, where approximately 1:10.000 individuals are affected. There is an increased risk of cancer of both the bile ducts (160-1500x) and the large bowel (5x). There is limited treatment options available, and PSC is one of the most common indications for liver transplantation in Scandinavia.

Affected individuals are typically young (30-40 years old) and have concurrent inflammatory bowel disease (IBD) in 60-80% of the cases. Disease course is highly variable from patient to patient, but median time from diagnosis to liver transplantation is 15-20 years. Individuals with PSC often suffer from fatigue, itching and repeated bacterial infections in the bile ducts.



Primary Sclerosing Cholangitis (PSC) is a patchwork of different phenotypes in addition to the bile duct affection. Most important are inflammatory bowel disease (IBD), malignancy and other autoimmune diseases.

Content:

What is PSC? Page 2
Leader's comments Page 3
Overview of the Center Page 4
Accounting Page 6

Focus areas
Mapping inflammation where it happens: Spatial approach to understanding PSC Page 7
Experimental gnotobiology: A tool to study gut-liver axis in PSC Page 8

Research Groups
Genomics and Metagenomics Research Group Page 10
Clinical Liver Research Group Oslo Page 12
Clinical Liver Research Group Bergen Page 14
Clinical Liver Research Group AHUS Page 16
Experimental Hepatology Research Group Page 18

ScandPSC Page 20
IPSCSG Page 22
Highlights Page 24
Dissertations Page 27
Grants Page 28
New people Page 28
Networks and Collaborations Page 29
Publications Page 32

NOPSC ANNUAL REPORT 2025

More information at the web pages:
www.ous-research.no/nopsc
www.med.uio.no/klinmed/english/research/groups/primary-sclerosing-cholangitis/index.html
FRONT PAGE:
Postdoc Beate Vestad working in the lab.
EDITOR: Merete Tysdahl
PUBLISHER: Oslo University Hospital
PRINT: Møklegaard Print Shop AS, 2026.
SAMPLES: 250

Leader's comments 2025

Professor Tom Hemming Karlsen

On behalf of the Leadership,
Professor
Tom Hemming Karlsen
Head of NoPSC

The year of 2025 hosted several significant events and achievements. But in the process of finalizing the printing process of this 2025 annual report in May 2026, an even more significant and unfortunate event occurred; the initiator of the philanthropic backbone of the Norwegian PSC research center – Stein Erik Hagen - passed away on May 4th 2026. The stability and strength the philanthropic support from Stein Erik Hagen and Canica AS have provided unique support for PSC research in Oslo (and beyond) since 2007, a long-term type of approach to research that is unprecedented in the liver disease field. The growth from a small team of 3-4 people to the current center with around 40 active researchers and a world-wide network of collaborators, all spins from the long-term vision for transformative change for PSC that he installed to our activities. We remain forever grateful for his support, and will remain loyal to the mission which is yet to be completed in our future collaborations with Canica AS.

The center activities are at a good place: the "next generation NoPSC" is now at cruising altitude, with 5 stable groups led by professors and associate professors at 3 different institutions, and as reflected in the budgets and accounting, the upscaling of activities to account for the current phase of the Norwegian PSC research center is now at the level where it was planned to be. Significant funds are also coming from competitive grants; most prominently illustrated in 2025 by the prestigious ERC consolidator grant to Johannes Hov, who implicitly was called for a full professorship at the University of Oslo, leaving even more time for PSC research on his side.

Philanthropy, however, remains essential to further progress in a rare disease such as PSC; and the generous support of the Halloran Family foundation to support the prolongation of the ScandPSC initiative is going to be critical as a platform to further biomarkers and clinical trials in PSC – consolidating the current orientation of the NoPSC towards clinical impact and clinical implementation. The ScandPSC initiative also illustrates how the slow disease processes in PSC, with complications developing over decades, warrant persistence far beyond the normal public funding cycles of 3-5 years to achieve goals. Similar to the way the core NoPSC biobank is currently serving dozens of international projects to elucidate PSC for the benefit of patients, it is now time to harvest from the resources of ScandPSC.

Among the many events over the year, I find particularly the abstract presentation of the norucholic acid phase III trial at the EASL congress (to which several of the groups contributed), and the publishing of the Nature Medicine paper on a potential role of Epstein-Barr virus (EBV) infection in PSC causation worth noticing. Having a first drug in PSC on the market, even with apparent limitations, instils hope, and will also help guide the development of further, and more effective therapies in PSC. And understanding how PSC arises and progresses will be crucial for early detection and even potential prevention of PSC, with the EBV data serving a major first piece to complete this complex puzzle.
In January the team made another shift towards a "next generation" leadership, with the retirement of Kirsten Muri Boberg. Having benefited from her meticulous eye for details and a lifetime of experience in the management group of NoPSC - as a founding member together with Erik Schrumpf and myself - since 2007, we still recognize the resilience of the current NoPSC organization, which allows activities to continue in full force under the current leadership.

Overview of the Norwegian PSC Research Center

NoPSC was established in 2007 at the Medical Department, Rikshospitalet, upon signing the contract between the University of Oslo and Rikshospitalet on the handling of funds from Canica A/S. The basis of NoPSC is the generous longterm philanthropic donations from Stein Erik Hagen, Canica A/S, having been made regularly since 2007 to substantially strengthen long-term research related to basic and clinical aspects of the chronic liver disease Primary Sclerosing Cholangitis.

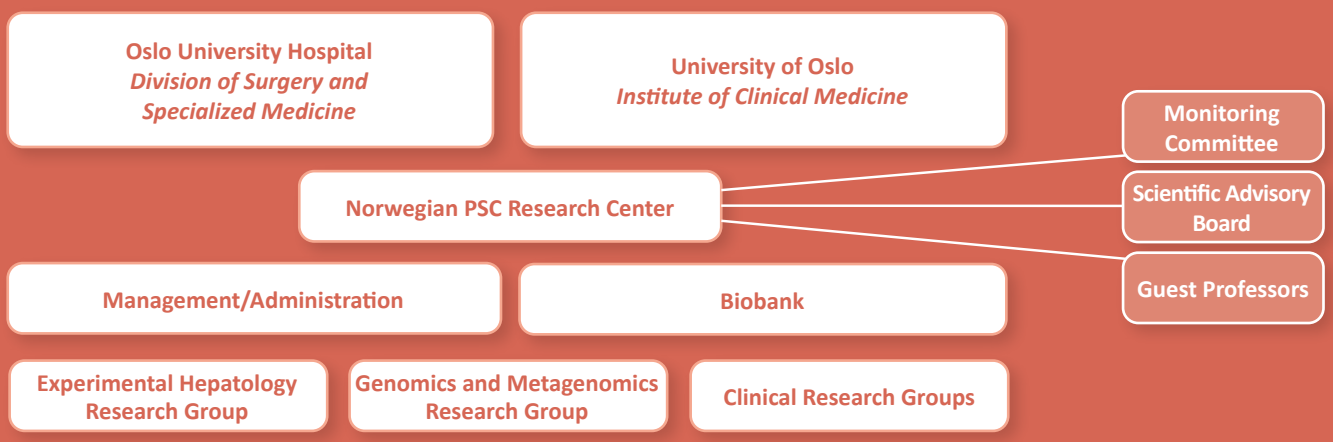
The philantropic funding is made with a grand vision of making a difference for people with PSC, and has given the research environment stability to prosperously grow its activity with 10 year horizons for each funding period.

Aims of the PSC Research Center

- Facilitate high standard PSC research via prudent and targeted use of research funds
- Support the development and implementation of clinical tools and relevant drugs
- Run PSC biobanks and registries to strengthen high quality PSC research globally
- Promote research on critical disease mechanisms in PSC
- Enhance awareness on PSC and PSC research and seek patient partnership when relevant

ORGANIZATION

NoPSC has status as a center at the Medical Faculty, Institute of Clinical Medicine, University of Oslo, and is organized within Oslo University Hospital as a section (level 4 unit) within the Department of Transplantation Medicine at the Division of Surgery and Specialized Medicine. The Experimental Hepatology Group and the Genomics and Metagenomics Group are organized at the Research Institute of Internal Medicine, Oslo University Hospital, while the Clinical Groups are organized within the Section of Gastroenterology at the Department of Transplantation Medicine at Oslo University Hospital, at Haraldsplass Deaconess Hospital in Bergen and at Akershus University Hospital, respectively.



MANAGEMENT GROUP

The Management Group has the overall responsibility for the research activities performed at the Center and the day-to-day management.

Prof. Tom Hemming Karlsen
Center leader
t.h.karlsen@medisin.uio.no

Prof. Emerita Kirsten Muri Boberg
kboberg@ous-hf.no

Prof. Espen Melum
Group leader
espen.melum@medisin.uio.no

Prof. Johannes Roksund Hov
Group leader
j.e.r.hov@medisin.uio.no

Assoc. Prof. Trine Folseraas
Group leader
trine.folseraas@medisin.uio.no

Prof. Mette Vesterhus
Group leader
mette.vesterhus@uib.no

Prof. Kristin Kaasen Jørgensen
Group leader
k.k.jorgensen@medisin.uio.no

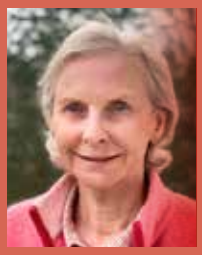
Merete Tysdahl
Administrative coordinator.
merged@ous-hf.no

MONITORING BOARD

The Monitoring Board oversees that the Center is managed according to the aims. Scientific plans and next years budget are dicussed in the autumn, while the Annual report and the accouting are rewieved at the spring/summer meeting.

LEADER
Prof. Dag Kvale,
Head of the Institute of Clinical Medicine, University of Oslo

Astrid Aksnessæther
Assistant director, Institute of Clinical Medicine, University of Oslo



Nina Paulsen
Canica A/S

MD Daniel Sørli
Canica A/S

Janne M. Gripheim,
Head of department of transplantation medicine, Oslo University Hospital

Prof. Bente Halvorsen,
Head of the Research Institute of Internal Medicine, Oslo University Hospital

Jan Ole Stangeland
CEO, Canica A/S

Prof. Tom Hemming Karlsen, and Merete Tysdahl *are also part of the monitoring board.*

GUEST PROFESSORS 2023 - 2025

Dr. Jan Tchorz
Institutes for BioMedical Research, Basel, Switzerland

Dr. Fotios Sampaziotis
Wellcome - MRC Cambridge Stem Cell Institute, UK

Prof. Tom Lüdde
University of Düsseldorf, Germany

SCIENTIFIC ADVISORY BOARD 2023 - 2026

The Scientific Advisory Board (SAB) reviews the center biannually.

Prof. Ole Andreassen
University of Oslo, Norway

Prof. Pål Rasmus Njølstad
University of Bergen, Norway

Prof. Frank Tacke
Charité - Universitäts-medizin Berlin, Germany

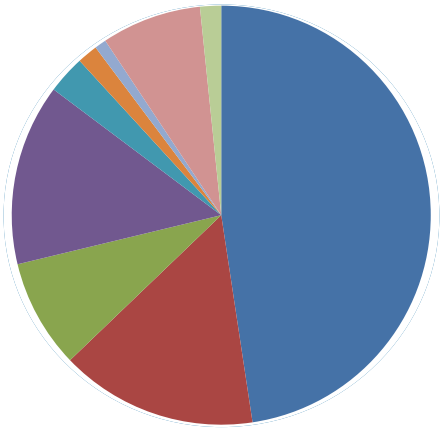
ACCOUNTING

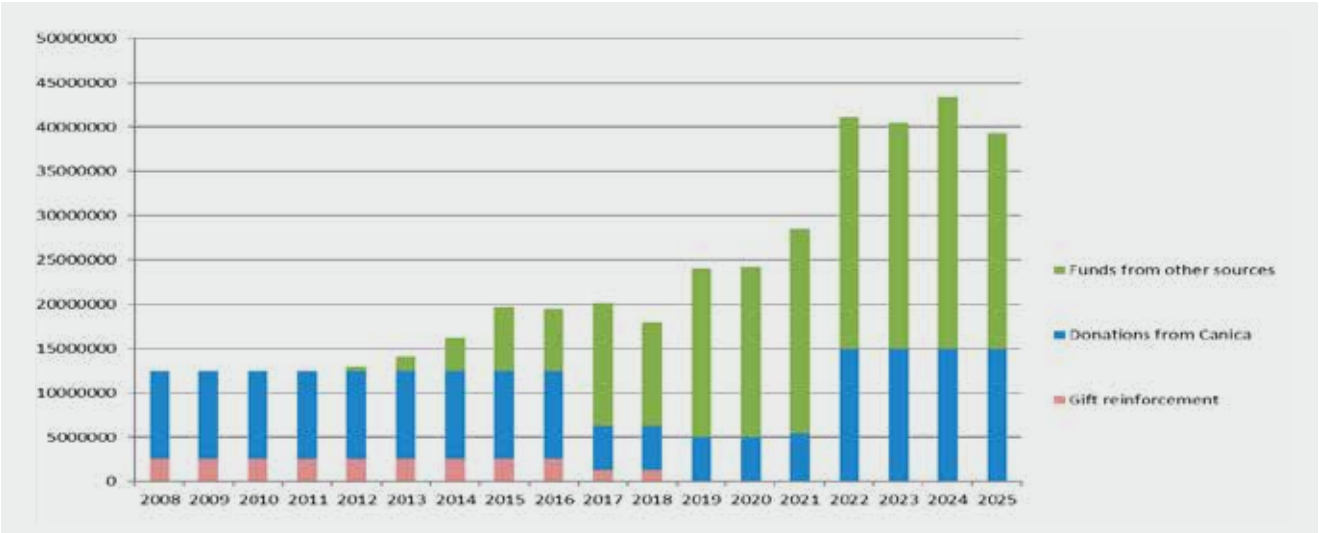
Expenditures from Canica AS funding in 2025 were NOK 22.151.865, -. The overall expenditure of all projects within the center amounted to NOK 46.523.000, - of these NOK 4.249.000, - was provided by Ministry of Education and Research, University of Oslo and Oslo University Hospital, and NOK 12.360.000, - was from independent, competitive grants from Regional Health Authorities, the Norwegian Research Council and EU. The remaining NOK 4.718.000, - was from various public and private institutions, with the main contributions being generously provided by the Halloran Family Foundation in the USA.

2025	OSLO UNIVERSITY HOSPITAL		UNIVERSITY OF OSLO	
	INCOME	EXPENSES	INCOME	EXPENSES
TRANSFER FROM 2024	-6 335 463		21 418 260	
INTEREST			796 187	
FROM CANICA			15 000 000	
OTHER INCOME	837 906			
TRANSFER FROM UIO	13 644 998			13 644 998
WAGES		6 378 159		3 517 812
OVERHEAD		332 050		366 023
OPERATING EXPENCES		11 303 307		253 514

Expenditures	2025
Canica	22 151
Regional Health Authorities in Norway	7 080
Norwegian Research Council	3 910
University of Oslo	6 515
EU funding (ERC/Scientia Fellow)	1 370
Oslo University Hospital	734
PSC Partners	419
The Halloran Family Foundation	3 588
Other	756
	46 523

The pie chart shows the expenditure distribution between different sources





Focus areas

MAPPING INFLAMMATION WHERE IT HAPPENS: SPATIAL APPROACH TO UNDERSTANDING PSC

Xiaojun Jiang and Brian Chung

Despite decades of research, a central question in primary sclerosing cholangitis (PSC) has remained unanswered:
Why does inflammation affect specifically the bile ducts?

Over the past year, our center has made a strategic investment in a transformative research direction known as spatial biology. This approach allows us to study immune cells not in isolation, but in their natural location within patient tissues—precisely where disease unfolds.[1] This represents a conceptual shift in how we study PSC.

From "Which Cells?" to "Where and Why?"
Traditional immunology tells us which immune cells are present in diseased tissue. In PSC, inflammatory T cells—including Th17-type cells—are known to play an important role.[2] However, immune cells do not act randomly. In PSC, inflammation is highly localized to the bile ducts. The bile duct epithelium itself appears to actively shape immune behavior. What we lacked until recently was the ability to systematically analyze this interaction in its anatomical context. To dissect the spatial biology of PSC, we have established an expertise in methodologies that enable the precise measurement of gene expression (spatial transcriptomics) and are complementing this discovery tool with multiplex immunofluorescence to pinpoint the subcellular expression of molecular interactions at the protein-level. By combining spatial transcriptomics and proteomics, our multiomic approach can specifically:

- Visualize immune cells exactly where they reside in inflamed bile ducts
- Identify inflammatory "hotspots" around bile ducts
- Classify the cross-communication of epithelial cells and immune responses
- Define microenvironments that sustain chronic inflammation

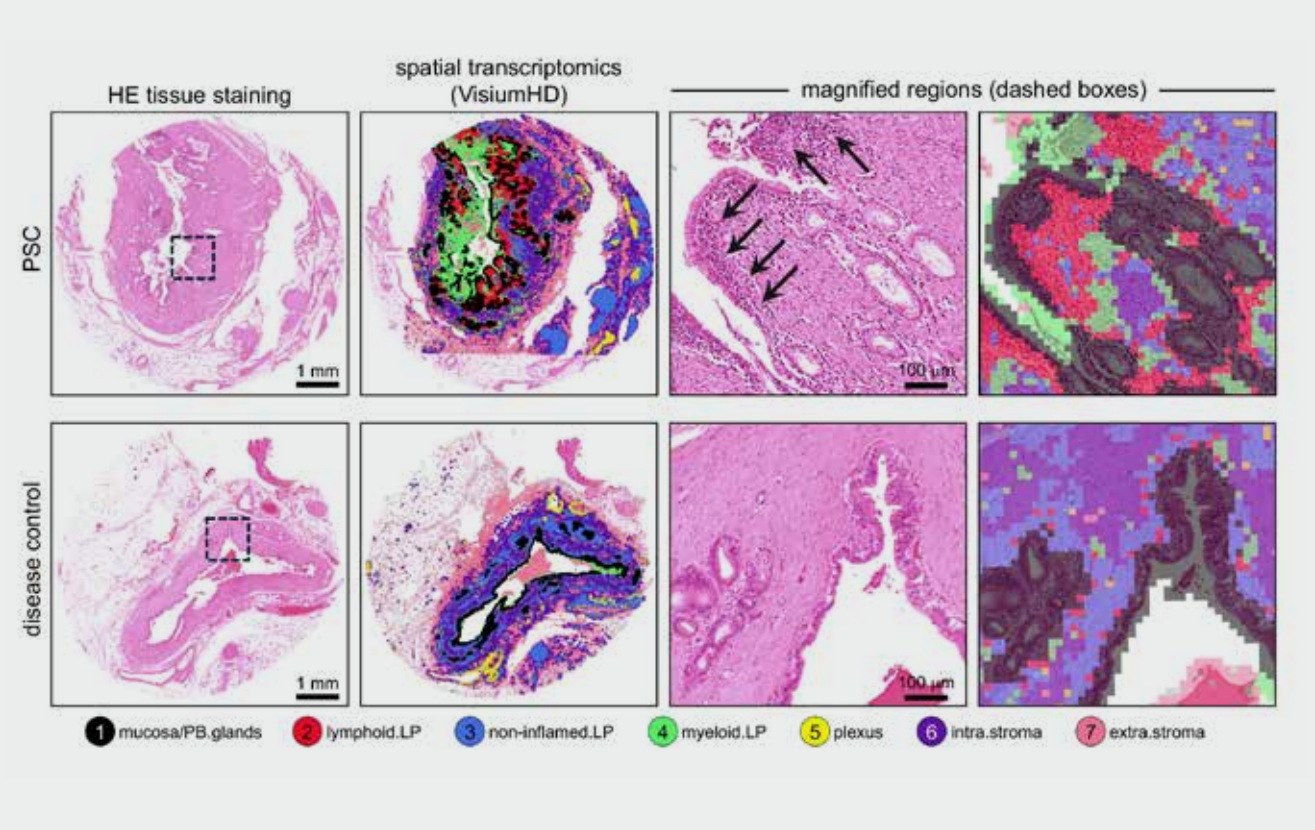
Instead of studying detached cells or individual cells generated from digested tissue, we can now study the disease as an organized mosaic of cells within their tissue ecosystem.

What We Have Learned So Far
Our early findings suggest that PSC is not simply driven by the presence of inflammatory cells—but by the formation of stable, self-reinforcing inflammatory areas surrounding bile ducts.[3, 4]
In these peri-ductal areas, we have discovered:

- Inflammatory B and T cells in direct contact with bile duct cells
- Increased activation of immune pathways related to microbial defense
- Decreased production of protective molecules at the mucosal-biliary interface

These insights change how we think about disease persistence. Rather than a globally dysregulated immune system, PSC may be sustained by localized immune–epithelial miscommunication. Understanding this miscommunication may open entirely new therapeutic possibilities.

Strategic Investment in Technology and Expertise
To enable this work we use advanced spatial transcriptomics technologies (Visium HD, Xenium and Stereo-seq) to map where genes are active across liver sections. In parallel, highly multiplexed imaging approaches (Fluidigm Hyperion and Akoya PhenoCycler) allow us to visualize how immune and bile duct cells interact at the protein level. Together, these technologies provide a layered view of inflammation, linking tissue structure, gene activity, and cellular function. Importantly, these tools do not serve a single project, they form a long-term strategic platform that will support multiple research lines and collaborations in the years to come.



Spatial organization of extrahepatic bile duct inflammation in PSC. Representative hematoxylin and eosin (HE) staining and spatial transcriptomics (VisiumHD) of extrahepatic bile duct tissue from an individual with PSC (top row) and disease control (bottom row). Colored regions (1-7) indicate different tissue regions as defined by gene expression measured by spatial transcriptomics. Dashed boxes indicate location of magnified tissue areas. Black arrows denote infiltrating immune cells in direct contact with biliary epithelium. Abbreviations: PB, peribiliary; LP, lamina propria; intra, intramural; extra, extramural.

1. Bressan D, Battistoni G, Hannon GJ. The dawn of spatial omics. Science 2023;381:eabq4964.
2. Manns MP, Bergquist A, Karlsen TH, et al. Primary sclerosing cholangitis. Nat Rev Dis Primers 2025;11:17.
3. Chung BK, Ogaard J, Reims HM, et al. Spatial transcriptomics identifies enriched gene expression and cell types in human liver fibrosis. Hepatol Commun 2022;6:2538–2550.
4. Chung BK, Jordens MS, Ogaard J, et al. Multimodal transcriptomics identifies metallothionein as a novel pathway in primary sclerosing cholangitis. Hepatology 2026;83:1066–1081.

EXPERIMENTAL GNOTOBIOLOGY: A TOOL TO STUDY GUT-LIVER AXIS IN PSC

Petra Hanzely

Life without microorganisms has fascinated scientists since the 19th century. There were different views on “sterile” life, with some researchers claiming that it would be impossible to live without bacteria, while others thought it might be even beneficial as we would not need to deal with toxic bacterial by-products. These thoughts led to the development of the first germ-free animals, with germ-free mice being the most important in medical research.

Germ-free mice lack all bacteria, viruses, protozoa and fungi and are used to study how specific microbes or even entire human microbiota affect the host and what impact they

Picture: private

The Tore Midtvedt Research Unit for Experimental Gnotobiology with breeding isolators, where germ-free mice are housed.

have on health and disease. This is of high relevance, especially in primary sclerosing cholangitis (PSC), where growing evidence suggests that the gut microbiota plays a key role in disease development. The research field that uses germ-free animals and animals colonised with known microbiota is called gnotobiology. In order to keep these mice truly germ-free, researchers use specialised sealed systems called isolators. By HEPA filtration and positive pressure, isolators ensure protection for mice and prevent contamination with unwanted microbiota. The original Tore Midtvedt Research Unit for Experimental Gnotobiology at the Department of Comparative Medicine (KPM), Rikshospitalet, established in 2017, had four isolator units. These have been mostly used for breeding and housing of germ-free mice while experiments were mostly performed using individually ventilated cages, where the risk of contamination has a high significance.

The facility has now undergone a major upgrade, funded by CANICA, the Simon Fougner-Hartmann Family Foundation and the Paul A. Owren foundation. On December 11, 2025, the official opening of Experimental Gnotobiology 2.0 took place. Contamination risk is significantly reduced using this upgraded infrastructure, as experiments are performed in hermetically closed isocages. The new isocage system provides more experimental conditions while having all key features of a traditional isolator. The new facility provides researchers with access to advanced technology and specialized expertise to investigate how the microbiota influences health and disease using gnotobiotic mouse models.

The new unit is crucial for studying how gut bacteria actually influence biology in general, and in particular bile duct diseases. In ongoing research activities, we use stool samples from people with PSC or healthy controls to colonise germ-free mice. We aim to pinpoint bacteria that act as disease drivers and modifiers. We also use mono-colonised gnotobiotic mice, where only a single bacterial species is introduced to further understand the underlying mechanisms. This approach allows us to study how individual bacteria influences disease progression or on the other hand may alleviate the disease.

References:

Luckey, TD, 1963. Phylogenetic development of germfree research. In: Germfree Life and Gnotobiology. Academic Press, New York, pp. 34-98

Kummen M, Holm K, Anmarkrud JA, et al. 2016. The gut microbial profile in patients with primary sclerosing cholangitis is distinct from patients with ulcerative colitis without biliary disease and healthy controls. Gut, 66 (4), pp. 611-619

Hanzely P, Holm K, Bjørnholt JV, et al. 2025. Efficacy of oral and rectal administration of human faecal microbiota transplant (FMT) in human microbiota-associated mouse models. Sci Rep, 15, 45099

Vestad B, Hanzely P, Karaliūtė I, et al. 2025. Modulation of Dextran Sodium Sulfate-Induced Colitis in Germ-Free Mice by Enterococcus

Research groups

GENOMICS AND METAGENOMICS IN INFLAMMATORY DISEASES RESEARCH GROUP

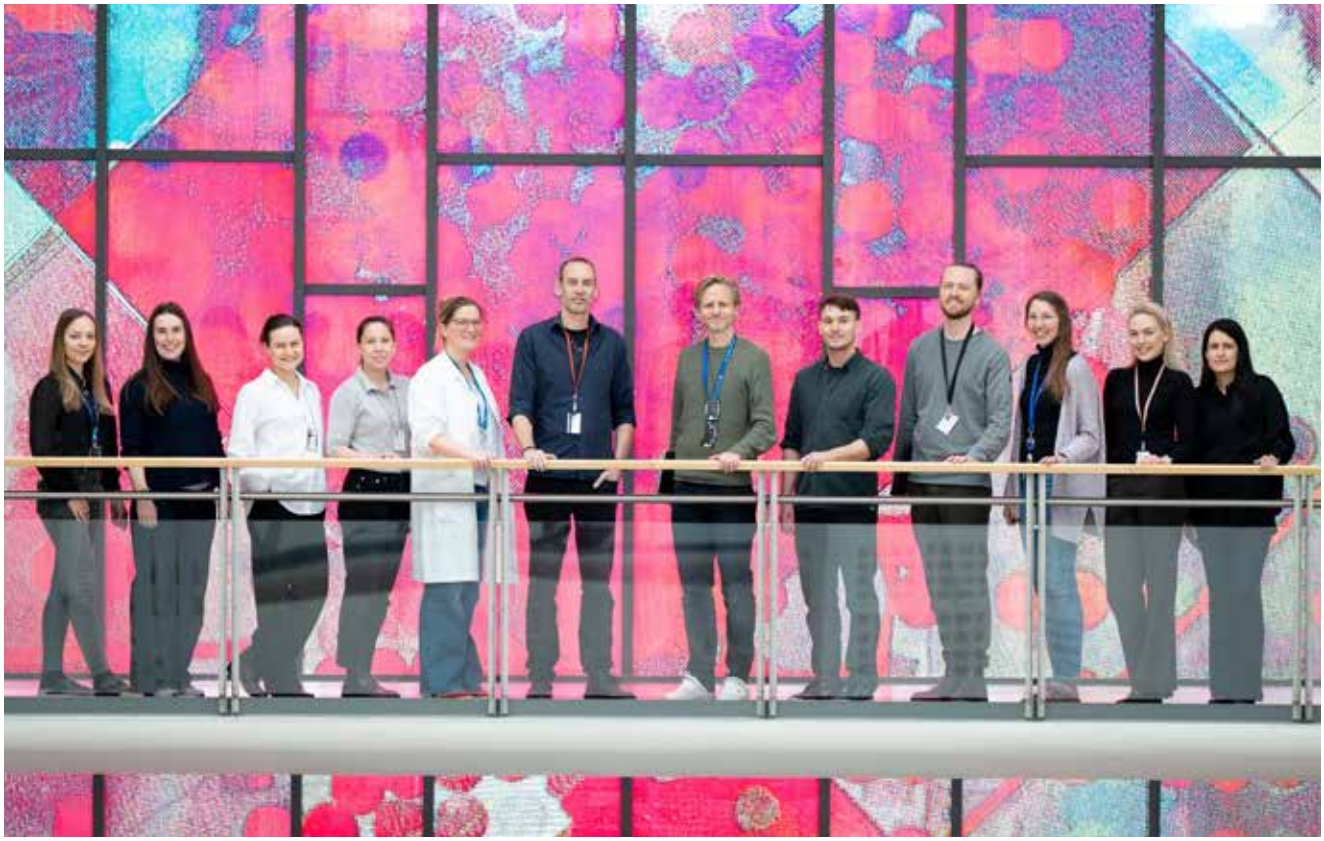


Photo: Åsne Rambøl Hillestad, University of Oslo

From left: Beate Vestad, Maria Maseng, Marit Larsen Bergum, Sara K.V. Tjønnfjord, Lise Katrine Engesæter, Kristian Holm, Johannes R. Hov, Jørgen D. Rønneberg, Peder Braadland, Petra Hanzely, Sandra Lund and Isma Sohail.

GROUP LEADER
Johannes R. Hov, Prof. MD
j.e.r.hov@medisin.uio.no

POST DOCS
Georg Schneditz, MSc, PhD
georg.schneditz@medisin.uio.no

Peder Braadland, MSc, PhD
pbraadland@gmail.com

Petra Hanzely, MSc, PhD
petra.hanzely@medisin.uio.no

Beate Vestad, MSc, PhD
beate.vestad@studmed.uio.no

Indre Karaliute, MSc, PhD
indre.karaliute@medisin.uio.no

PHD STUDENTS
Lise Katrine Engesæter, MD
lisek78@hotmail.com

Mikal J. Hole, MD
m.j.hole@studmed.uio.no

Simen Hyll Hansen, MSc
s.h.hansen@medisin.uio.no

Maria Maseng, MSc
maria@bio-me.com

Jørgen D. Rønneberg, M.Sc.
j.d.ronneberg@studmed.uio.no

Sara K. V. Tjønnfjord, MD
s.k.v.tjonnfjord@studmed.uio.no

Isma Sohail
isma.sohail@studmed.uio.no

MASTER STUDENT
Sandra Arildsdatter Lund, BSc
lundsaar@gmail.com

CORE STAFF
Hanne Lyche Alme, BSc, Study nurse
hanlyc@ous-hf.no

Kristian Holm, MSc, Bio-informatician
kristian.holm@medisin.uio.no

ASSOCIATED RESEARCHERS
Alejandro Chinillach, MSc, PhD
alejandro.torregrosa@kemi.uu.se

RESEARCH PROFILE

The genomics and metagenomics group aim to characterize and understand how the human genome and the gut microbiome influence inflammatory disease, and how this knowledge can be applied clinically. Our general approach is to use unbiased discovery tools like nontargeted high-throughput omics (e.g. sequencing and metabolomics), followed by targeted hypothesis-driven methods, supported by bioinformatics and biostatistics including machine-learning.

We study primary sclerosing cholangitis both before and after liver transplantation (with or without recurrence) together with healthy individuals and patients with inflammatory bowel disease. Our main human materials are blood and fecal samples, but we are also establishing methodology for microbiota profiling in low-biomass material (blood, tissue, bile), while our experimental agenda involves germ-free, gnotobiotic and conventional mice with induced biliary or intestinal disease as well as advanced in vitro/ex vivo models (organoid systems), in collaboration with the Experimental Hepatology group. In 2025, a milestone was reached by the expansion of the gnotobiotic unit with new modern equipment, even better suited for our activities.

Our current main working hypothesis is that biochemical footprints of microbial activity is driving disease. We aim to define altered functional microbial changes using metagenome sequencing (i.e. the study of all microbial genes) and metabolomics. Our first interesting finding was that altered microbial metabolism of essential nutrients is altered in PSC, with deficiency of vitamin B6 as a potential disease-modifying factor caused by microbiome changes. A clinical trial focusing on translational aspects of vitamin B6 supplementation is ongoing and completes recruitment early 2026 (Pyridoxine in primary sclerosing cholangitis, PiPSC). This represents an example on how we work to identify and potentially treat altered microbial functions, defining their clinical impact as biomarkers or in therapy.

Recurrence of PSC after liver transplantation is a significant clinical problem, and our work to describe it in detail (clinically) in the Norwegian population is in its final phase. An important question is whether PSC and recurrent PSC represent the same disease, which would make recurrence useful as a "human model" of disease. This was the underlying idea of the ERC Starting Grant project *StopAutoimmunity*, which was formally completed in 2024, where we among other observations have identified overlapping features in PSC before and after liver transplantation. Multiple other studies are in their final phase following this project. Importantly, Hov was awarded a new ERC grant in 2024 – the Consolidator grant *FatVersusBile*, which formally opened May 1, 2025, and focus on intestinal drivers and determinants of liver health.

With growing data size and complexity, we increasingly depend on bioinformatics and statistics. In our IBD-focused projects, now comprising thousands of samples, in collaboration with the Inflammatory Bowel Disease in South-Eastern Norway 3 study, we have applied more advanced bioinformatics and artificial intelligence to improve the yield from big data from microbiome or metabolome analyses (several studies published or in submission). In 2025, this was the basis of the PhD defense of Simen Hyll Hansen (Dec. 2025), based on his thesis entitled *Diagnostic and Prognostic Potential of the Gut Microbiome in Inflammatory Bowel Disease*.

Finally, we continue our agenda on the targets of autoimmunity in PSC - does it originate in the gut? And further studies of GPR35 in inflammatory disease are also ongoing, supported by funding to the center leader Karlsen and post doc Georg Schneditz.

FUNDING

The group leader was awarded an ERC Consolidator grant at the end of 2024 to the project "FatVersusBile", which will be very important in the group activities until 2030. In addition, the group is funded by multiple grants from the Regional Health Authorities of South-Eastern Norway, as well as Canica, and two UIO funded postdocs.

KEY NATIONAL AND INTERNATIONAL COLLABORATORS

- Locally, the group has extensive collaborations ongoing within NoPSC and the Research Institute of Internal Medicine, multiple clinical research groups (including in particular the IBD group at the Ullevål campus) as well as pathology and radiology.
- Regionally and nationally, the group has been working in the ReMicS network (Regional research network for clinical Microbiota Science).
- Internationally, we have strong collaborations both within and outside the International PSC Study Group, with the currently strongest links to Swedish groups in Stockholm,Gothenburg and Uppsala, in addition to US groups (Brigham, Mayo clinic) and Germany (Kiel).

CLINICAL LIVER RESEARCH GROUP, OSLO

Photo: Åsne Rambøl Hillestad, University of Oslo

From left: Merete Tysdahl, Sigurd Breder, August T. Juliebø, Kirsten Muri Boberg, Trine Folseraas, Ina Marie Andersen, Sissel Åkra and Marit Larsen Bergum.

GROUP LEADER
Trine Folseraas, Ass. Prof. MD
trine.folseraas@medisin.uio.no

RESEARCHERS
Kirsten Muri Boberg, Prof.em. MD, PhD
kboberg@ous-hf.no
Kristine Wiencke, MD, PhD
kwiencke@ous-hf.no
Lars Aabakken, Prof., MD, PhD
lars.aabakken@medisin.uio.no
Vemund Paulsen, MD
vempau@ous-hf.no

PHD STUDENTS
Sigurd Breder, MD
sigurd.breder@medisin.uio.no
Ina Marie Andersen, MD
inaand@ous-hf.no
Marit Mæhle Grimsrud, MD
maritmg@medisin.uio.no

MEDICAL STUDENT
August T. Juliebø
august.julieboe@gmail.com

CORE STAFF
Merete Tysdahl, MSc, Administrator
merged@ous-hf.no
Sissel Åkra, MSc, Biobank Manager
uxkrsi@ous-hf.no
Liv Wenche Thorbjørnsen, BSc, Engineer
liwtho@ous-hf.no

RESEARCH PROFILE

RESEARCH PROFILE

The Clinical Liver Research Group at Oslo University Hospital, Rikshospitalet, focuses on improving the understanding, diagnosis, and treatment of PSC and PSC-associated biliary tract cancer (BTC). Our work is organized around four core aims: (1) operation and development of the NoPSC biobank and database, (2) support of national and international PSC/BTC research, (3) development of tools for risk prediction and early diagnosis of PSC-associated BTC, and (4) improved selection and follow-

up of PSC patients undergoing liver transplantation.

1. **The NoPSC biobank and patient registry is a key infrastructure for PSC research**.
   By the end of 2025, it included close to 1,050 individuals with PSC, as well as cohorts of other liver diseases, BTC, and healthy controls. The biobank holds serum, plasma, bile, biliary brushes, stool, urine, and liver and tumor tissue. Its broad, cross-sectional profile reflects the tertiary referral status of Oslo University Hospital Rikshospitalet and complements the prospective biobanking efforts of the National Network for Autoimmune Liver Disease and the ScandPSC initiative. Together, these resources form an important basis for improving outcomes in PSC before and after liver transplantation.

2. **PSC Research Support and Collaboration**
   We support national and international research by providing high-quality clinical data and biobank material to collaborative studies and registries.We actively recruit patients for clinical trials. In 2025, we concluded participation in the phase III NUC PSC trial and opened inclusion for a vitamin B6 study in PSC. Our prospective PSC cohort, followed at Rikshospitalet since 2013, is an essential platform for these and future studies.

3. **PSC-Associated Biliary Tract Cancer**
   Our PSC-BTC work focuses on risk prediction and early diagnosis. In 2025, Dr. Marit Mæhle Grimsrud completed a PhD combining genetic analyses of PSC-related tumors with bile-based molecular profiling, identifying distinct tumor features and promising biomarkers for earlier cancer detection. This line of research continues through projects led by PhD students Ina Andresen and Sigurd Breder, who investigate blood- and bile-based biomarkers for BTC risk prediction and early detection. The group also contributes to international BTC research through ENS-CCA and the COST Action CA22125: Precision BTC Network

4. **Liver Transplantation**
   Our transplantation research aims to improve selection, cancer risk assessment, and post-transplant outcomes in PSC. Together with Prof. Annika Bergquist's group at Karolinska Institutet, we have established a retrospective cohort of more than 500 PSC liver transplant recipients, enabling evaluation of indications, diagnostic pathways, and outcomes in patients transplanted with and without BTC. First results were published in 2025, and the cohort supports several ongoing projects.

KEY COLLABORATORS

- **The Department of Pathology, Oslo University Hospital, Rikshospitalet, Norway**
- **The Epigenetics Group at the Department of Cancer Prevention, Institute for Cancer Research, the Norwegian Radium Hospital, Norway**
- **Karolinska University Hospital, Stockholm, Sweden**
- **Helsinki University Hospital, Finland**
- **Biotech Research and Innovation Centre, Department of Health and Medical Sciences, University of Copenhagen, Denmark**
- **Institute of Clinical Molecular Biology, Christian-Albrechts-University, Kiel, Germany**
- **The Department of Pathology at the University Hospital of Heidelberg, Germany**
- **Biodonostia Institute, Donostia University Hospital, San Sebastian, Spain**
- **The Mayo Clinic, Rochester, USA**
- **The IPSCR, Amsterdam MC, the Netherlands**
- **The International PSC Study Group (IPSCSG)**
- **European Network for the Study of Cholangiocarcinoma (ENSCCA)**
- **COST Action CA22125: Precision medicine in biliary tract cancer**

CLINICAL LIVER RESEARCH GROUP, BERGEN

Photo: Private

From left; Holmfridur Helgadottir; Mette Vesterhus, Karen Rønneberg and Cesilie Dahll.

GROUP LEADER
Mette Vesterhus, Prof. MD
mette.vesterhus@uib.no

POST-DOC
Holmfridur Helgadottir, MD, PhD
holmfridur.helgadottir@haraldsplass.no

CORE STAFF
Karen Rønneberg, BSc, Study nurse
karen.ronneberg@haraldsplass.no

Ingeborg Brønstad, MSc, PhD, Technician
Ingeborg.bronstad@helse-bergen.no

Cesilie Dahll, MSc, Technician
cesilie.dahll@haraldsplass.no

ASSOCIATED RESEARCHERS
Guri Fossdal, MD, PhD
guri.fossdal@haraldsplass.no

Kosta Petrovic, **MD, PhD**
kosta.petrovic@helse-bergen.no

RESEARCH PROFILE

The Clinical Research group in Bergen aims to develop prognostic biomarkers and instruments for patient reported outcome measures (PROM) towards qualification for regulatory approval and clinical implementation. For this purpose, we established a national, prospective PSC cohort within the National network for autoimmune liver diseases and ScandPSC, The management, monitoring, and further development of these multicenter prospective cohorts, as well as the running of our large local patient cohort, are important tasks for our group.

Our research may improve patients' lives by providing tools to tailor clinical follow-up and improve clinical trials design. The ScandPSC biobank and the national prospective PSC registry, both serve as important resources supporting international research through collaborative projects. We also contribute to clinical trials, using the prospective

registry to identify suitable participants.

BIOMARKERS OF DISEASE ACTIVITY AND PROGNOSIS

We identified and validated the ELF test as a robust prognostic marker in PSC, leading to its inclusion in current EASL guideline recommendations and clinical availability in Norway since August 2024. The ELF test remains a focus of our research in collaboration with international partners, aiming for FDA and EMA approval as a surrogate endpoint in PSC trials. In parallel, we are advancing studies on dynamic fibrosis biomarkers, PRO-C3 in particular, through a long-standing partnership with Nordic Biosciences in Denmark.

Given the complexity of PSC, we hypothesize that a multimarker panel integrating biomarkers from distinct pathogenic pathways may outperform single markers in predicting disease risk and outcomes. We have assembled a large cohort of over 900 patients from Scandinavia and the Mayo Clinic and are currently evaluating a broad spectrum of biomarkers, aiming to explore the predictive performances of multibiomarker models in a proof-of-concept study. This represents one of the most extensive biomarker studies conducted in PSC and will be concluded in 2026.

Advancing into a new era of biomarker research in PSC, we are now ready to launch studies of other prognostic biomarkers, using large, prospective PSC panels with repeated measures, including the international FICUS biobank and the ScandPSC biobank. During the next few years, we aim to build a framework for prospective characterization of the variability, progression, and predictive abilities of proposed and novel biomarkers in PSC and in subgroups based on phenotype or stage. This will allow robust risk assessment to improve and personalize patient follow-up and clinical trial design.

PRURITUS AND PROMS

We are contributing to the development of two novel PROM instruments, the SCCS and the UK quality-of-life measure for PSC, in two international multicenter studies. Pruritus reduces the quality of life for many people living with PSC. In an ongoing study in collaboration with the Metabolomics and Lipidomics group at Oslo University hospital, we aim to identify the causative agent (pruritogen) or pathways of cholestatic itch using global metabolomics and lipidomics as well as hypothesis-driven analyses. This may identify therapeutic targets.

IMAGING

Imaging is relevant for prognostication as well as cancer surveillance in PSC. In 2025, we initiated a study of spleen stiffness measurements by FibroScan in PSC as a putative, novel prognostic tool. We also participate in several ongoing international collaborative studies of MRI for prognostication and detection of CCA in PSC.

THE AIL STUDY AND SCANDPSC

Co-ordinated by our group, the National network for autoimmune liver diseases (AIL-study) is a multicenter, observational cohort study established 2019 collecting clinical and PROM data as well as biological samples at annual study visits. Through the effort of dedicated local study teams, the AIL-study recruits participants from 24 centers across all Norwegian health regions, currently including about 900 people with non-transplant PSC. About 20% of the participants are included by our group in Bergen. Because the AIL study is an extension of a previous prospective cohort study dating back to 2013, a proportion of the patients now have over 10 years of prospective follow-up.

KEY COLLABORATORS

- The Mayo Clinic, Rochester, USA
- Karolinska University Hospital, Stockholm, Sweden
- Nordic Biosciences, Herlev, Denmark
- IPSCR, Amsterdam AMC, the Netherlands
- Helsinki University Hospital, Finland
- UCL Institute for Liver and Digestive Health, Royal Free Hospital, London, UK
- Bevital, Bergen, Norway
- International PSC Study Group (IPSCSG)
- Norwegian Centre of Excellence in Gastrointestinal Ultrasonography, Bergen, Norway
- Metabolomics and Lipidomics, Dept Med Biochem, Oslo University Hospital, Norway

CLINICAL LIVER RESEARCH GROUP, AKERSHUS UNIVERSITY HOSPITAL (AHUS)

Photo: Stian Ødegård, Ahus.

From left: Ragnhild S Bergheim, Narcisa M Lupu, Aida K Lunder, Anne Negård, Kristin K Jørgensen, Stine Dommersnes, Mari Vingdal and Usha Tharmathas.

GROUP LEADER
Kristin K Jørgensen, Prof. MD
k.k.jorgensen@medisin.uio.no

RESEARCHERS
Aida K Lunner, MD, PhD
Aida.Kapic.Lunder@ahus.no

Anne Negård, Prof. MD, PhD
anne.negard@medisin.uio.no

PHD STUDENTS
Usha Tharmathas, MD
usha.tharmathas@ahus.no

CORE STAFF
Mari Vingdal, BSc, Study nurse
Mari.Vingdal@ahus.no

Stine Dommersnes, BSc, Study nurse
Stine.Dommersnes@ahus.no

Narcisa M Lupu, Study secretary
Narcisa-Madalina.Lupu@ahus.no

RESEARCH PROFILE

The Clinical Liver Research Group at Ahus focuses on the development and implementation of clinical tools and treatment in PSC. Our aim is to contribute to new knowledge regarding surrogate endpoints and novel therapies in the treatment of PSC through both investigator- and industry initiated clinical trials.

PROJECTS

PRO-C3 AS A PROGNOSTIC BIOMARKER AND A SURROGATE ENDPOINT IN PSC

PRO-C3 is a dynamic marker of fibrosis and earlier studies in collaboration with Nordic Biosciences have identified PRO-C3 as a promising prognostic biomarker in PSC.

Our PhD candidate Usha Tharmathas studies the natural variability of PRO-C3 in PSC, and investigates PRO-C3 both as a prognostic biomarker and a potential surrogate endpoint in clinical trials.

INVESTIGATOR-INITIATED CLINICAL STUDIES

Novel clinical trials

We have established the clinical liver trial unit at Ahus, with a objective of recruiting individuals with PSC into high-level, multicenter clinical trials, implementing appropriate study designs, suitable study and control groups, valid biomarkers and relevant study endpoints. Our aim is to explore new therapeutic options for PSC, an area that is underexplored hence no medical therapy for PSC is currently available.

AIL and ScandPSC

Our research group participates in the National Network for Auto-immune Liver Diseases (AIL-study) in Norway where our included patients comprising nearly one fifth of the cohort. The collaboration also includes work in a parallel Swedish initiative, jointly comprising the ScandPSC cohort (see page 20-21 for more details).

Pyridoxine Treatment in Primary Sclerosing Cholangitis (the PiPSC study)

This multicentre, phase II, double-blinded, randomized controlled cross-over study compares pyridoxine supplementation to a placebo (see page 10-11 for details).
Our centre is participating in the trial, with PhD candidate Tharmathas responsible for screening, inclusion, and follow-up of patients. The study results concerning exploratory biomarkers for efficacy assessments will be included in her thesis.

IBSEN III: Liver disease in inflammatory bowel disease (IBD)

We participate in the IBSEN III study led by Prof. Marte L Høivik at Oslo University Hospital. This prospective, observational trial consists of a large, population-based inception cohort including all incident IBD patients in the South-Eastern Health Region of Norway over a three-year period (2017-2019). In particular, we contribute to the PSC-screening branch of the study by performing liver MRIs on all included patients at Ahus, in conjunction with the five-year follow-up. With the aim of exploring the incidence and type of liver pathology in a large cohort of Norwegian IBD-patients.

We also engage in international PSC study initiatives and have contributed to several research articles from these collaborations (see publication list for details).

INDUSTRY-INITIATED CLINICAL STUDIES

Our study group participate in multiple phase 2 and 3 industry initiated, randomized, controlled clinical trials in autoimmune liver diseases (PSC and primary biliary cholangitis); evaluating treatment with norucholic acid (NCA), obeticholic acid and elafibranor. We have been participating in the NUC-5/PSC phase 3 study comparing NCA with placebo over 96 weeks, proceeded by an additional double-blind phase and an ongoing open-label extension phase. In addition we have participated in the NUC-11/BIO phase 1 study on the pharmacokinetics of NCA in PSC patients, and the NUT-22/PSC phase 3 open-label study investigating the efficacy and safety of NCA in PSC is currently ongoing. We also participate in the ELASCOPR Phase 3 study investigating the efficacy and safety of elafibranor in PSC.

Our group also provides scientific advice to the industry on drug development for autoimmune liver diseases.

KEY COLLABORATORS

- The International PSC Study Group (IPSCSG)
- Karolinska University Hospital, Dept. of Gastroenterology and Dept. of Radiology, Stockholm, Sweden.
- The IBSEN III (the IBD in South-Eastern Norway) study group, Ullevål University Hospital, Oslo, Norway
- The IPSCR, Amsterdam AMC, the Netherlands
- Hannover Medical School, Department of Diagnostic and Interventional Radiology, Germany.
- Mayo Clinic, Dept of Radiology and Division of Gastro-enterology & Hepatology, Minnesota, USA
- Nordic Bioscience A/S, Herlev, Denmark
- Dr. Falk Pharma GmbH, Freiburg, Germany
- Intercept Pharmaceuticals, Morristown, USA
- Ipsen Bioscience, Inc. Cambridge, USA

THE EXPERIMENTAL HEPATOLOGY LIVER RESEARCH GROUP

Photo: Åsne Rambøl Hillestad, University of Oslo

From left: Henrik Rasmussen, Jeremy (Wen Jie) Yeoh, Sarah Peisl, Kathrine Sivertsen Nordhus, Sachiko Kanei, Oda Helgesen Ramberg, Espen Melum, Henry W. Hoyle, Mughilan Selvarajah, Chiara Tauscher, Enya Amundsen-Isaksen, Brian Chung, Milton Antwi, and Jonas Øgaard.

GROUP LEADER
Espen Melum, Prof. MD
espen.melum@medisin.uio.no

SENIOR SCIENTISTS
Xiaojun Jiang, MSc, PhD
xiaojun.jiang@medisin.uio.no

Brian Chung, MSc, PhD
b.k.chung@medisin.uio.no

Kathrine Sivertsen Nordhus, MSc, PhD
k.s.nordhus@medisin.uio.no

Anna Frank, MSc, PhD
anna.frank@medisin.uio.no

POST DOCS
Elisabeth Schrumpf, MD, PhD
el.schrumpf@gmail.com

Henry W. Hoyle, MSc, PhD
h.w.hoyle@medisin.uio.no

Marie-Christin Röcklinger, MSc, PhD
m.c.rocklinger@medisin.uio.no

Wen Jie (Jeremy) Yeoh, MSc, PhD
w.j.yeoh@medisin.uio.no

Sachiko Kanei, MD, PhD
sachiko.kanai.419@gmail.com

PHD STUDENTS
Laura Valestrand, MD
lauravalestrand@gmail.com

Tine Simensen Oldereid, MD
tine.oldereid@gmail.com

Markus Jördens, MD
markus.joerdens@
med.uni-duesseldorf.de

Lisa Brynjulfsen, MSc
l.r.v.brynjulfsen@medisin.uio.no

Mughilan Selvarajah, MSc
mughilan.selvarajah@medisin.uio.no

CORE STAFF
Oda Helgesen Ramberg, MSc, Lab. Manager
odaram@ous-hf.no

Enya Amundsen-Isaken, MSc, Technician
enya.amundsen-isaksen@medisin.uio.no

Oline Øie Hovland, MSc, Technician
o.o.hovland@ous-research.no

Jonas Øgaard, MSc, Researcher
jonas.ogaard@medisin.uio.no

RESEARCH PROFILE

The experimental liver research group is one of the three NoPSC research groups based in Oslo and focuses on experimental and translational studies related to primary sclerosing cholangitis (PSC). In 2025 the group consisted of the group leader, four senior researchers, five postdocs, five PhD students, the lab manager, one researcher and two technicians. During Espen Melum's paternity leave during part of the autumn of 2025 Brian Chung was the acting group leader. The overarching topic in the group is to understand mechanisms regulating cholangitis. All projects in the group have a clear translational focus.

In 2025 we finished several of our ongoing spatial transcriptomics and single-cell/nuclei based assessments of bile duct inflammation. We published the largest study of PSC samples examined with spatial transcriptomics across different areas in the liver and indications for transplant and found that the metallothionein pathway was upregulated at the parenchyma-fibrosis interface compared to disease controls.

Another study starting from a mouse model examined pathology in NOD.c3c4 mice using spatial transcriptomics at different time-points of disease development. This analysis highlighted a CD226-NECTIN2 interaction in the mice. The CD226-NECTIN2 interaction was solidified at the protein level and was also shown to be present in PSC patients. In the autumn of 2025, we followed up this finding with functional *in vitro* experiments. Besides the human and NOD.c3c4 project we continued our spatial transcriptomics-based projects in the bile duct ligation (BDL) and oxazolone induced cholangitis model. Our available datasets from human PSC patients are attractive datasets for several ongoing targeted assessments in collaborative projects. In parallel with the publication of the sequencing-based datasets we have made them available to the community through a new portal (https://riim-data.no/index2.html) developed by Jonas Øgaard in the group.

Our strong collaboration with the Hybrid-technology-hub on the bile-duct-on-a-chip was further strengthened in 2025. In November 2025 Henry Hoyle, who leads the team in the group working on the chip, graduated from the University of Oslo's SPARK program for commercialization. The spin-off company DUCTmimic was incorporated in 2025 aiming to offer CRO services to the pharmaceutical industry. This commercialization process was also supported by a new qualification grant from the Norwegian Research Council in 2025. The first version of our bile-duct-on-a-chip now forms the foundation for three ongoing projects and the remaining data for the first publication using the chip was finalized in 2025. In parallel with the first version of the chip running "in production" we made significant advances for the version 2 of the chip where we will integrate the immune system. In March 2025 Sarah Peisl joined the bile-duct-on-a-chip team as an exchange PhD student from Bern in Switzerland and has been using the system to specifically interrogate the response to bacterial compounds. To further strengthen the team Mughilan Selvarajah was recruited as a PhD student to work on disease modelling and drug effects using the chip.

Our collaboration with Novartis in Basel on a drug-screen made important progress in 2025 with postdoc Marie Röcklinger advancing the project with regards to the reliability of the setup. The system is now ready for the large scale-screen which will take part in the first half of 2026.

From our studies using murine models we finalized a project using different mouse models with alteration of the NKT-cell populations in the BDL model along with a novel model developed together with our collaborators in Vienna with specific deletion of CD1d on the biliary epithelium. We also finalized a project demonstrating specific activation of MAIT-cells by direct bile duct challenge with specific antigens. In the CD100 project we have in 2025 focused on long-term effects of the liver pathology in mice harboring the CD100 mutation we have shown to predispose to liver disease. In October Sachiko Kanei from Tokyo University joined the group as a postdoc fellow, she has solid background in clinical hepatology and basic research aiming to understand immune-cholangiocyte signaling.

A major event for the group was Laura Valestrand's PhD defense of her thesis on 28 November 2025. The work explored the role of unconventional T cells in biliary disease and cholestasis. The assessment committee consisted of Magdalena Filipowicz Sinnreich, Reidar Fossmark , and Asbjørn Christophersen. Laura did very well during the defense and the opponents raised very relevant points and asked insightful questions.

Strategic Prospective Scandinavian PSC Biobank (ScandPSC)

Strategic Prospective Scandinavian PSC Biobank (ScandPSC)
ScandPSC integrates two leading scientific environments in Norway and Sweden in a coordinated initiative to establish a large, prospective collection of biological samples and comprehensive clinical data for people with PSC. Scandinavia constitutes a recognized PSC "hot spot," characterized by high willingness in patients to participate in research, minimal loss to follow-up, and access to unique population-based national registries. Together, these factors provide an excellent infrastructure for conducting high-quality, well-powered prospective studies with substantial translational potential.

Photo: Private

Line Lindstrøm and Hofi Helgadottir discussing at the ScandPSC meeting in Oslo, January 2025.

MANAGEMENT GROUP

Mette Vesterhus, Prof. MD
Haraldsplass Deaconess Hospital, Norway

Annika Bergquist, Prof. MD
Karolinska University Hospital, Sweden

Kristin Kaasen Jørgensen, Prof. MD
Akershus University Hospital, Norway

Martin Cornillet, MSc, PhD
Karolinska University Hospital, Sweden

Trine Folseraas, Ass. Prof. MD
Oslo University Hospital, Norway

Lina Lindstöm, MD, PhD
Karolinska University Hospital, Sweden

STEERING COMMITTEE

National PI Annika Bergquist (Sweden) and Mette Vesterhus (Norway). Lead physicians from collaborating centers (CI) in Norway and Sweden.

MONITORING BOARD

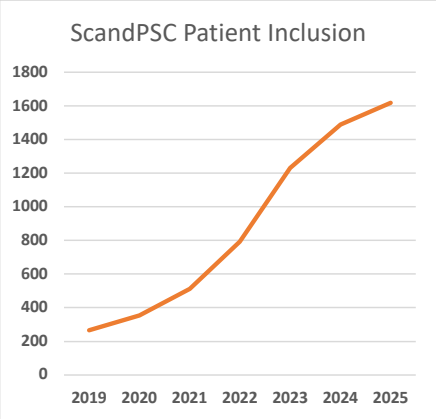
The Monitoring Board of the Norwegian PSC Research Center (NoPSC) will oversee the management of the funds.

Employed Project Coordinator

Karen Rønneberg, study nurse, Norway

FUNDING

The project is funded by a generous donation from the Halloran family foundation.



ECONOMY

Expenses 2025		
Norway	Salaries	70 972
	Biobank- and visit-related expenses	2 296 430
	Meetings	12 776
	VAT, will be compensated	169 160
Sweden	Biobank- and visit-related expenses	1 039 086
	SUM expenses	**3 588 424**

PROJECT STATUS 2025

The initial goal of including 1300 individuals was passed in May 2024, and by December 2025, the ScandPSC Biobank was the largest prospective biobank for PSC worldwide. The ScandPCS Biobank follows a common SOP, with decentralized sample collection at active centers and centralized sample storage in Norway and Sweden. Ensuring high-quality data, physician-registred clinical data and patient-reported outcomes (PROMs) are collected prospectively at structured annual study visits. The eCRFs and national databases are harmonized across the two countries and monitored according to a monitoring plan.

By the end of 2025 the prospective cohort included biobank serum samples from 1624 people with PSC recruited at 35 active centers (Norway 25, Sweden 10), of which 900 in Norway and 724 in Sweden. By 31.03.2025, ScandPSC included data and biobank samples from about 6000 study visits and over 600 have at least 5 years of follow-up in the study.

According to a preliminary analysis of a subset of monitored data from Norway from August 2025, study participants exhibit typical demographic characteristics for PSC;

- Median age of about 46 years at inclusion and 38 years at diagnosis.
- The majority are male (66%) and have IBD (74%).
- About 11% have PSC-AIH and 5% have small-duct disease.
- Pruritus affected about one third and near 10% were severely affected.
- Less than 10% of participants had cirrhosis at inclusion.

PRIORITIES FOR 2026

The main priority of the project has shifted from study expansion to securing follow-up visits and to running, refining, and utilizing the ScandPSC prospective data registry and biobank. In 2025, data quality was secured through monitoring according to the monitoring plan. We started a project (to be completed by Q3 2026) to develop algorithms which will produce common data sets safely and efficiently, allowing easy utilization of the huge resource that ScandPSC constitutes. We plan to publish the first paper characterizing the ScandPSC participants in 2026, showcasing the potential utility of the ScandPSC Biobank. Subsequent studies in the pipeline will utilize ScandPSC data as well as biobank analyses.
The ScandPSC Biobank will be open for applications from the scientific community and industry from 2026.
Information is announced at meetings in the International PSC study group and made available via our website **https://www.haraldsplass.no/scandpsc/**

IPSCSG
International PSC Study Group

Annual report IPSCSG 2025

In 2025, the International PSC Study Group (IPSCSG) continued its efforts to advance research and strengthen collaboration in the field of Primary Sclerosing Cholangitis (PSC). The year was characterized by a series of focused meetings and workshops that brought together researchers from across the IPSCSG network.

Photo: Private

IPSCSG meeting at EASL Congress in Amsterdam 2025.

Photo: Private

IPSCSG meeting at the AASLD Conference in Washington November 2025.

As in previous years, IPSCSG maintained a strong presence at major international liver conferences. Regular IPSCSG meetings were held at both the European Association for the Study of the Liver (EASL) and the American Association for the Study of Liver Diseases (AASLD) congresses. The IPSCSG meeting during the EASL Congress took place on 8 May 2025 and included updates on ongoing collaborative projects such as IPSCR, CALiD, and FICUS, as well as discussions on working group activities and future directions of the consortium. Later in the year, the IPSCSG meeting at AASLD was held on 8 November 2025 in Washington, D.C., with the option for virtual participation. The meeting featured presentations on multiple international projects, including biomarker studies, imaging initiatives, and registry-based analyses, alongside updates from the different working groups and discussions on the future structure of IPSCSG collaborations. Another important initiative in 2025 was the IPSCSG MRI Workshop, which took place on 13 October at the Medical University of Vienna. The workshop aimed to facilitate the development of collaborative MRI-based research projects and to promote the exchange of ideas in a focused and interactive setting. Participants were encouraged to contribute project proposals and actively engage in discussions to advance imaging research in PSC. The meeting was organized by Michael Trauner, Sarah Pötter-Lang, Ahmed Ba-Sallamah, and Emina Halilbasic.

A central highlight of the year was the IPSCSG Young Investigators Workshop, held on 22–23 September 2025 at Amsterdam UMC in the Netherlands, organized by Cyriel Ponsioen. The workshop brought together early-career researchers under the age of 40 working in both clinical and translational PSC research. Over one and a half days, participants attended lectures by leading experts and presented their own research in short presentations, fostering an interactive and collaborative environment. The program covered key topics including PSC pathophysiology, translational research, observational studies, and career development, while also promoting networking among young investigators. Through these activities, IPSCSG continued to provide important platforms for scientific exchange, strengthen international collaboration, and support the next generation of researchers in the PSC field.

The IPSCSG community was deeply saddened by the passing of Professor Michael Manns in August 2025, one of the most influential figures in modern hepatology and an early supporter of the group. He described PSC as the “last black box of hepatology” and encouraged IPSCSG to advance understanding and develop effective therapies for this complex disease. His legacy continues to inspire the group’s mission and ongoing work.

On behalf of the IPSCSG secretariat at University Medical Centre Hamburg-Eppendorf, Germany

Highlights

Symposium in honor of the achievements and retirement of Prof. Kirsten Muri Boberg
On January 28th a seminar with invited guests: Prof. Ulrich Beuers AMC, Netherlands and Prof. Annika Bergquist Karolinska Institutet, Sweden, was arranged to celebrate the research contributions from Kirsten Muri Boberg. There was also a festive dinner in honor of Kirsten Muri Boberg as she retired.

Norwegian Gastroenterology Association
At the annual meeting 2025 of the Norwegian Gastroenterology Association (Norsk Gastroenterologisk Forening, NGF) at Lillehammer, Hofi Helgadottir was elected as board member. She was also on the board of NGF's FUNGF (Fagutvalg for utdanningskandidater i gastroenterologi) in 2025. Trine Folseraas took over as leader after Kristin Kaasen Jørgensen of the Liver Disease Interest group and Espen Melum led the committee for NGF's research funds, presented the annual report and announced the winners. PhD student Isma Sohail received 10.000 NOK in support from "Mage-tarm forbundet" and a 10.000 NOK award from NGF for best abstract in the Liver/Bile/Pancreas theme for the project; "Low vitamin B6 status associates with cholagiocarcinoma in primary sclerosing cholangitis" and Hofi Helgadottir received a 30.000 NOK grant for the project «Translasjonell forskning knyttet til kolestatisk kløe». NoPSC also contributed with an article in the NGF news magazine (NGF-nytt) by Hofi Helgadottir and Mette Vesterhus in in 2025; "BRIC type 1 på Vestlandet".

Max Siurala award
Tom Hemming Karlsen received the Max Siurala award in 2025. The award is given to someone recognized for their distinguished scientific research in the field of gastroenterology. Karlsen received the award in a ceremony at the Annual meeting for the Finnish Society of Gastroenterology in Helsinki, Finland, on February 6th, 2025, recognizing his significant contributions to gastroenterology and hepatology research over the last 20 years.

In the media
In Mars 2025 «Fordøyelsen», a magazine published by the patient organization "Mage-Tarm forbundet", featured an article called "Ny medisin gir håp til pasienter med sjelden leversykdom". This reflected the ongoing testing of Norucholic acid, a new drug for PSC patients in the NUC-5 study, a phase III study intended towards getting official approval of the drug. Kristin Kasen Jørgensen and Tom Hemming Karlsen was both quoted. The same drug study was also presented on the news on NRK TV May 18th interviewing Kristin Kaasen Jørgensen and a patient included in the study. The study was also presented at the NoPSC Monitoring Board meeting in June.

ERC Consolidator Grant project «FatVersusBile»
The European Research Council (ERC) awarded an ERC Consolidator Grant of 2 million Euros for five years to Johannes Hov's project; "Fatty liver versus autoimmunity of the bile ducts - defining the gut signals driving steatosis and inflammatory disease of the gut-liver axis (FatVersusBile)", which started in May 2025. This was acknowledged in an article in "Dagens medisin" on March 13th and also featured on the web pages of the Institute of Clinical Medicine at UiO.

Annual meeting of the Japanese Society of Gastroenterology
Tom Hemming Karlsen was an invited speaker and guest at the annual meeting of the Japanese Society of Gastroenterology meeting in Tokyo April 2025. Meeting chair Prof. Takanori Kanai acknowledged Tom Hemming Karlsen with a diploma for his contribution.

Mayo collaboration
Our collaboration with Prof. Konstantinos Lazaridis and coworkers at the Mayo Clinic contiuned in 2025 with digital "Lab Retreats" on Zoom containing short presentations from both groups, followed by discussions focussed on potential for collaborative projects.

Research Institute of Internal Medicine
The annual RIIM spring seminar was held on 25th of April at Thon Hotel Slottsparken. NoPSC was strongly represented at this event, which consisted of a varied research program focused on the common theme "AI in research".

12th Annual Cholangiocarcinoma Foundation Conference
A leading international meeting was held in Salt Lake City, April 2025, focused on advances in cholangiocarcinoma research, clinical care, and patient advocacy. Trine Folseraas served as a member of the working group on biomarkers and early detection and participated as a session moderator.

The International Liver Congress
The annual International Liver Congress organized by the European Association for Study of the Liver (EASL) was arranged in Amsterdam, The Netherlands, May 7th to 10th 2025. A delegation from NoPSC participated and contibuted; Trine Folseraas reviewed abstracts before the event, Mette Vesterhus was an invited speaker and presented the following topic «Diagnostic dilemmas and risk stratification» at the «Mastering autoimmune and cholestatic liver disorders: Advanced clinical insights" session and participated in the panel in the subsequent discussion. Johannes Hov held the following presentation «Gut microbiome in PSC» at the «EASL/IPSCSG Future of Hepatology: Should we target gut microbiota in cholestatic diseases?» session. Lise Katrine Engesæter, Enya Amundsen-Isaksen, Lisa Brynjulfsen and Isma Sohail presented posters, and Isma Sohail also had an oral presentation.

Monothematic Conference: "Liquid Biopsy in Biliary Tract Cancer: From Bench to Bedside"
The conference was held in Mallorca, May 2025, during the annual meeting of the COST Action PRECISION BTC NETWORK, jointly with the bi annual ENS CCA conference. Trine Folseraas contributed to the scientific program by delivering the introductory presentation on the natural course of biliary tract cancer.

Visiting scientist
In 2025 we had two "Visiting scientist" meetings. Prof. Jordi Bruix from University of Barcelona, Spain was here May 19th, and Dr. Andreas Kremer visited on September 23rd, giving us days of fruitful discussion with research experts from other institutions.

Monitoring Board meetings
On June 13th the spring Monitoring Board meeting for NoPSC was held. Tom Hemming Karlsen presented the accounting and the annual report from 2024 and Kristin Kaasen Jørgensen presented "Norucholic acid – ny behandling ved primær skleroserende cholangitt". The second Monitoring Board meeting in 2025 took place on December 12th. The budget for 2026 was presented and approved and Johannes Hov presented the following: "Vitamin B6 ved primær skleroserende cholangitt. Og litt om ERC».

The Norwegian Liver Meeting
As leader of the Liver Disease Interest group in NGF Trine Folseraas played a large role in arranging and leading the Norwegian/National Liver Meeting in Oslo September 17th 2025. Mette Vesterhus presented the following title: "ScandPSC: epidemiologi og kliniske trekk ved PSC" and Prof. Lars Aabakken, from the Clinical Liver Research group, Oslo presented under the title of: "Endoscopic treatment of Varices".

Guest Professor meeting
The 2025 Guest Professor meeting took place 21-22 October, with Dr. Fotios Sampaziotis and Dr. Jan Tchorz. The meeting included sessions with groups and individuals for discussions and mentoring.

Foreningen for Autoimmune Leversykdommer (FAL)
The ongoing collaboration with the patient organization FAL is both useful and enjoyable, and we are very pleased to involve patients as active participants in reviewing new and ongoing research projects. In

2025 our meeting with FAL was on November 18th at Rikshospitalet and focused on presenting ongoing research and several grant applications by Espen Melum, Johannes Hov, Trine Folseraas, Mette Vesterhus, Kristin Kaasen Jørgensen and Sheraz Yaqub.

Prof. Michael P. Manns - Academic memorial service
An academic memorial service for Prof. Michael Peter Manns, was held at the Hannover Medical School, Germany, November 22nd. Keynote speech was by Tom Hemming Karlsen, who worked closely with Michael Manns for many years, and lately in particular with the EASL–Lancet Commission; “From evidence to impact: Implementing sustainable liver health in Europe”.

Hans Popper Lecture 2025
The Medical University of Vienna honors Hans Popper, one of the founders of modern hepatology, with an annual Lecture. Tom Hemming Karlsen was invited to hold this lecture in Vienna December 4th 2025, and was acknowledged for his outstanding vision, dedication and contribution to the field of hepatology.

Upgraded gnotobiotic unit at Oslo University Hospital
The Tore Midtvedt Research Unit for Experimental Gnotobiology at the Department of Comparative Medicine (KPM), Rikshospitalet, has been upgraded. NoPSC financed parts of this upgrade. The new unit is crucial for studying how gut bacteria influence biology in general, and in particular diseases of the bile ducts. The official opening on 11th December was conducted by Geir Teigstad, Director of Oslo Hospital Services.

The Biomedical alliance in Europe
The Biomedical Alliance in Europe (BioMed Alliance) is a unique initiative of leading European medical societies that aim to facilitate and improve biomedical research in Europe. Tom Hemming Karlsen is President of the Board from 2026-2027.

Dissertations

DR. LAURA VALESTRAND successfully defended her PhD thesis "Unconventional T cells in biliary immunology and cholestasis" at the University of Oslo November 28th 2025.

Principal Supervisor:
Prof. Espen Melum
Co-Supervisors: Prof. Tom Hemming Karlsen, Dr. Xiaojun Jiang and Prof. Pål Dag Line

The cause of PSC is unknown, but genetic studies suggest that the immune system plays a central role in disease development. In her thesis Dr. Valestrand explores how bile and immune cells contribute to the development of cholestatic liver diseases such as primary sclerosing cholangitis (PSC). Her studies in this thesis demonstrate that bile from patients with chronic liver diseases contains substances that activate the immune cells natural killer T (NKT) cells and mucosa-associated invariant T (MAIT) cells. These immune cells are abundant in the liver and have properties that can regulate immune processes in both protective and harmful directions. In a mouse model where the common bile duct was ligated, leading to accumulation of bile (cholestasis), the NKT cells were found to be specifically activated. When the common bile duct of mice lacking NKT cells was ligated, these mice developed less liver injury compared to bile duct ligated wild type mice. This indicates that NKT cells contribute to liver damage during cholestasis. To investigate the role of bile duct cells in NKT cell-related disease progression in cholestasis, a new mouse model was generated with specific loss of CD1d on bile duct cells, a molecule mediating NKT cell activation. By ligating the common bile duct of the novel model with specific loss of CD1d, bile duct cells were not found to be the main contributors to NKT cell related liver injury in acute cholestasis. These results provide new insight into how the immune system and bile interact in cholestatic liver diseases such as PSC. MAIT and NKT cells represent potential targets for future treatment aimed at protecting the liver and thereby improve the quality of life and survival for patients with these serious liver diseases.

DR. MARIT MÆHLE GRIMSRUD defended her thesis "Biliary tract cancer in primary sclerosing cholangitis - Genetic landscape and biomarkers" with success on December 8th 2025.

Principal Supervisor:
Ass. Prof. Trine Folseraas.
Co-Supervisors: Prof. Tom Hemming Karlsen, Prof. Kirsten Muri Boberg and Professor Guro Lind

Dr. Marit Mæhle Grimsrud's doctoral work is focused on the strong need for better tools that can detect cancer earlier and guide more personalized treatment in patients with PSC. The thesis combines genetic analyses of tumor tissue with molecular profiling of bile to improve early detection and identify features that may open the door to targeted therapies. Whole exome sequencing of PSC-related tumors showed that this cancer subtype has a distinct molecular profile, including alterations not previously linked to biliary tract cancer. The work further identified alterations in genes that are already targets for existing cancer drugs, suggesting future therapeutic potential for selected patients.
This work also explored bile as a diagnostic fluid. DNA from bile showed specific methylation patterns that distinguished cancer from non-cancer in PSC with very high accuracy, and these markers may detect cancer months before current methods.
In addition, protein analyses of extracellular vesicles in bile identified protein combinations that could both signal early-stage cancer and indicate which patients are at increased short-term risk of developing it.
Together, these findings highlight new molecular characteristics of PSC-related biliary tract cancer and demonstrate that bile-based biomarkers may offer more sensitive and earlier detection than today's tools.

DR. SIMEN HYLL HANSEN successfully defended his thesis "Diagnostic and Prognostic Potential of the Gut Microbiome in Inflammatory Bowel Disease", on December 15th 2025.

Principal Supervisor:
Prof. Johannes Hov
Co-Supervisor:
Prof. Marte Lie Høivik

In this thesis Dr. Hyll Hansen addresses the potential utility of the microbiome as a noninvasive marker in IBD diagnostics and prognostics. Specifically differentiating IBD from symptomatic non-IBD controls, distinguishing indolent from severe disease courses, and identifying phenotypic subgroups within IBD. The results show limited value of the microbiome as a general marker of IBD from symptomatically similar controls, since already established inflammatory markers like fecal calprotectin consistently outperformed microbiome profiles in this regard. However, there were consistent and relatively strong signals related within-IBD phenotypic characterization, with significant differences between CD and UC. The studies also showed that microbiome markers are related to future disease development. Overall, this indicate that the microbiome can bring significant value to future clinical workflows, both related to IBD diagnostics and prognostics, while acknowledging that the results show a variability and stochasticity which indicates that the microbiome may be unsuitable for standalone tests.

Grants 2025

Espen Melum, Henry Hoyle and Anna Frank, alongside Inven2, received an early-stage grant of 500.000 NOK from the Norwegian Research Council to test the commercialization potential of the DUCT Chip. The funding will be used to align the DUCT Chip platform with the needs of pharmaceutical companies and demonstrate the predictive potential with drug treatments.

Tom Hemming Karlsen, Brian Chung and Espen Melum were granted Open Project Support of 9 million NOK for 3 years from South-Eastern Norway Regional Health Authority for the project "Decoding bile duct disease for drug and biomarker development in primary sclerosing cholangitis (DecodePSC)".

New people NoPSC

Mughilan Selvarajah
MSc PhD student
mughilan.selvarajah
@medisin.uio.no

Sarah Peisl
PhD student
sarah.peisl
@unibe.ch

August T. Juliebø
Medical student
august.juliebo
@gmail.com

Sachiko Kanei MD
PhD Postdoctor
sachiko.kanai.419
@gmail.com

Networks and Collaborations

KEY LOCAL COLLABORATORS AT OSLO UNIVERSITY HOSPITAL

Research Institute for Internal Medicine (RIIM)
The research groups led by Espen Melum and Johannes Hov respectively are located at RIIM and several collaborative projects are established with the groups of, among others, Prof. Marius Trøseid, Prof. Thor Ueland and Prof. Bente Halvorsen.

Department of Transplantation Medicine (ATX)
The Clinical Liver Research group Oslo, led by Trine Folseraas, is located at ATX, and Prof. Pål-Dag Line and Dr. Bjarte Fosby collaborate with NoPSC on projects related to liver transplantation in PSC and induced murine models of cholangitis.

Department of Liver, Pancreatic and Children's Surgery
We collaborate with Prof. Sheraz Yaqub, Knut-Jørgen Labori and other co-workers in the Section of hepatobiliary and pancreatic surgery on PSC and cholangoicarcionoma research and biobanking.

Department of Rheumatology, Dermatology and Infectious diseases
Rheumatologists Prof. Øyvind Molberg and Dr. Anna-Maria Hoffmann-Vold collaborate with NoPSC on immunology and microbiome studies.

Department of Pathology
Dr. Henrik Reims and Dr. Krzysztof Grzyb are both involved in the histological and immunohisto-chemical evaluation of tissue samples from PSC patients and samples from experimental mouse models. Prof. Frode Jahnsen is a collaborator on microbiome studies.

Department of Gastroenterology
IBD research group leader Prof. Marte Lie Høivik is an important collaborator on IBD related projects together with Department Head Ass. Prof. Vendel Kristensen and Prof. Asle Medhus (leader of the Division of Medicine at OUH). Liver research group leader Prof. Håvard Midgard is a key collaborator for projects related to advanced ultrasound modalities.

Department of Comparative Medicine
For many years, NoPSC has had a close and productive collaboration with the Department Head Ass. Prof. Henrik Rasmussen and the staff at the animal facility.

Department for Medical Biochemistry, Metabolomics and Lipidomics
Section leader Dr. Katja B. Prestø Elgstøen and Dr. Helge Rootwelt and the Metabolomics and metabolic molecular biology research group collaborate identifying the causative agent (pruritogen) or pathways of cholestatic itch.

Department of Infectious Diseases
Dr. Dag-Henrik Reikvam is a key collaborator on gut microbiome studies.

Department of Medical Genetics
The Immunogenetics group, led by Prof. Benedicte A. Lie is involved in several projects related to the further characterization of the HLA association in PSC.

Institute for Cancer Research
The Epigenetics Research Group led by Prof. Guro Lind, at the Institute of Cancer Medicine is a key partner in ongoing projects targeting early diagnostic strategies for cholangiocarcinoma in PSC. The work is conducted in close collaboration with Dr. Hege M. Vedeld. Collaborative projects are also ongoing with Prof. Ragnhild Lothe's group (colorectal cancer) and Prof. Jon Amund Kyte at Dept of Cancer immunology (microbiome therapy).

Department of Radiology
The involvement of the Department of Radiology at Rikshospitalet in the prospective follow-up of PSC patients has been crucial for the success of the initiative. We are particularly grateful to Dr. Andreas Abildgaard, Dr. Gunter Kemmerich and Dr. Ida Björk for their active contributions.

Department of Paediatric Research
Department head Ass. Prof. Runar Almaas is an important collaborator on liver transplant research and pediatric PSC, and Dr. Gareth Sullivan on regenerative medicine.

KEY NATIONAL COLLABORATORS

University of Oslo
The Center of Excellence Hybrid Technology Hub (HTH) are valuable collaborators on lipidomics in PSC. Resent work on organ on a chip includes close collaboration with Prof. Hanne Scholz, Center director Prof. Stefan Krauss, Dr. Aleksandra Aizenshtadt and Dr. Petter Angell Olsen.

Akershus University Hospital
NoPSC group leader Prof Kristin K. Jørgensen is affiliated with the Department of Gastroenterology at Akershus University Hospital and is responsible for their Clinical Trial unit in Hepatology, encompassing

investigator - and industry-initiated clinical trials. Prof. Anne Negård and Dr. Aida Kapic Lunder at the Department of Radiology are important contributors and collaborators in MRI studies in PSC.

Haraldsplass Deaconess Hospital, Bergen
The NoPSC Clinical Research Group in Bergen, led by Mette Vesterhus, is located here. Haraldsplass Deaconess Hospital is the responsible institution for the data registry and the biobank of the National network for autoimmune liver diseases and the Norwegian part of ScandPSC. The NoPSC research group also engage in other strong collaborations at Haraldsplass.

Haukeland University Hospital and University of Bergen
For the prospective PSC cohort and advanced imaging modalities there is a close collaboration with Prof. Odd Helge Gilja and several other researchers at the Section for Gastroenterology and the Norwegian Centre of Excellence in Gastrointestinal Ultrasonography, at the Medical Department at Haukeland University Hospital in Bergen.

BEVITAL AS
Prof. Per Magne Ueland and co-workers at BEVITAL are important collaborators in projects related to metabolomic biomarkers, including biomarkers of microbial function.

KEY INTERNATIONAL COLLABORATORS

The Nordic Liver Transplant Group
Collaborators in Helsinki (Dr. Arno Nordin), Stockholm (Dr. Carl Jorns), Gothenburg (Ass. Prof. William Bennet) and Copenhagen (Dr. Allan Rasmussen) are involved in several projects using data from the Nordic Liver Transplant Registry.

Karolinska University Hospital, Stockholm, Sweden
Prof. Annika Bergquist is a close collaborator on clinical projects in PSC and is also participating in our genetics studies. Prof. Bergquist is also a part of the management group of the Strategic Prospective Scandinavian PSC Biobank. Prof. Niklas Björkström is involved in projects relating to human immunology in PSC.

University of Gothenburg, Sweden
Prof. Bäckhed, at the Molecular and Clinical Medicine department at Wallenberg laboratory, provides expertice on gut microbiota, metabolism and gnotobiotic animals and he has been a collaborator on gut microbiota studies in mice. Dr. Antonio Molinaro is also a close collaborator as new group leader within clinical and experimental hepatology in Gotheburg.

Uppsala University, Sweden
Prof. Daniel Globisch is an important collaborator in the Department of Chemistry for Life Sciences, providing unique expertise on the biochemistry of microbial metabolites. Shared Uppsala/NoPSC postdoc Alejandro Chinillach works on joint projects in the Globisch lab.

Nordic BioScience, Denmark
Morten Karsdal, CEO of Nordic Biosciences in Denmark, has focused his research on the discovery and development of novel biochemical markers of fibrosis. NoPSC collaborates with Nordic BioScience on several projects related to the characterization of fibrosis and the development of new, targeted, PSC-specific fibrosis markers as prognostic tools in PSC, in work particularly involving Dr. Diana Leeming.

Institute for Clinical and Molecular Biology, Christian-Albrechts University, Kiel, Germany
Prof. Stefan Schreiber and Prof. Andre Franke's groups in the German excellence cluster "Inflammation at interfaces" are involved in technically advanced projects within the genetic and metagenomic projects. We also have a fruitful ongoing collaboration with Dr. Hesham El Abd and Dr. Aya Mahdy.

University Hospital Heidelberg, Germany
Prof. Peter Schirmacher, Head of Pathology at the University Hospital Heidelberg, is a world-leading specialist in hepato-biliary pathology. Together with Prof. Stephanie Roessler he provides expertise to collaborative projects related to genomic profiling of PSC-associated biliary tract cancers. We also have a strong collaboration in projects related to circulating biomarkers in PSC (Dr. Peter Puchas, Dr. Michael Dill and Prof. Peter Sauer).

Vivantes Humboldt Hospital, Berlin, Germany
Dr. Tobias J. Weismüller, at Department of Internal Medicine, is an important collaborator within the IPSCSG, particularly regarding the IPSCSG Study Group (IPSCSG) database project comprising more than 8000 PSC patients.

University Medical Center Hamburg
From 2023 till 2026 the administration of IPSCSG (International PSC study Group) are in the capable hands of Prof. Christoph Schramm and Prof. Ansgar Lohse at University Medical Center Hamburg, Germany.

University of Amsterdam, Netherlands
We have a close collaboration with Prof. Cyriel Ponsioen and Prof. Ulrich Beuers at the University of Amsterdam's Faculty of Medicine, among other related to projects outgoing from the International PSC registry (IPSCR) initiative led by Prof. Ponsioen.

University of Cambridge, UK
Prof. Arthur Kaser, Head of the Division of Gastroenterology and Hepatology at Addenbrooke's Hospital, is still involved in one of the main translational work packages related to the functional characterization of the PSC risk gene; GPR35. This project was funded by the Regional Health South-East Health Authority in Norway through 2025 and involves Georg Schneditz and Dr. Nicole Kaneider-Kaser. Ongoing collaboration with Dr. Fotis Sampaziotis at Cambridge Biorepository for Translational Medicine at the Wellcome - MRC Cambridge Stem Cell Institute has proved extremely valuable regarding organoids and regenerative medicine.

University of Rome, Italy
Prof. Eugenio Gaudio, Domenico Alvaro and co-workers are experts on biliary tree stem cells, and material from the NoPSC Biobank are being used to explore these cells from PSC patients.

Donostia University Hospital, San Sebastian, Spain
Prof. Jesus M. Banales is the Head of the Liver Diseases Group at the Biodonostia Research Institute and the coordinator of the European Network for the study of Cholangiocarcinoma. Prof. Banales together with co-workers Dr. Ainhoa Lapitz Dambolena and Dr. Pedro Miguel Rodrigues Vieira serve as a important collaborators on projects related to PSC-associated biliary tract cancers.

Hospital Clinic of Barcelona, Spain
In 2020 we established collaboration with the Barcelona Clinic Liver Cancer (BCLC) group. This center, led by Maria Reig, is world leading on hepatocellular carcinoma research. Key collaborating researcher is Dr. Marco Sanduzzi-Zamparelli.

University of Bern, Switzerland
The collaboration with Prof. Annalisa Berzigotti at the Department of BioMedical Research in Bern is ongoing and MD PhD student Sara Peisl has conducted her research in our labs at Rikshospitalet most of 2025.

University of Zürich, Switzerland
In 2025 we initiated a collaboration with Prof. Andreas Kremer, at the Depertment of Gastroenterology and Hepatology, regarding pruritus in PSC.

Medical University of Vienna, Austria
The experimental group collaborates with Prof. Michael Trauner and Dr. Claudia Fuchs-Steiner at the Medical University of Vienna on projects related to cholangiocyte functions and in particular the use of cholangiocyte organoids, The clinical groups also collaborate with Prof. Trauner on studies related to norucholic acid.

European Network for the Study of Cholangiocarcinoma (ENSCCA)
NoPSC, represented by Trine Folseraas, participates in the European Network for the Study of Cholangiocarcinoma (ENSCCA), a collaborative research initiative that promotes cholangiocarcinoma interests across basic, translational and clinical research, as well as in the COST Action CA22125: Precision Medicine in Biliary Tract Cancer (Precision BTC Network).

Toronto General Hospital, Canada
Dr. Gideon Hirschfield, at Centre for Liver Disease, continues the collaboration with NoPSC. Biostatistician Bettina E. Hansen is leading the statistical analyses of clinical data collected in the International PSC Study Group (IPSCSG) database project, assisted by Dr. Aliya Gulamhusein at the same institution.

The Mayo Clinic, Rochester, USA
Collaboration with Dr. Konstantinos Lazaridis at the Mayo Clinic in Rochester is ongoing regarding our projects on multiple aspects of PSC, particularly with the use of omics technologies. We also collaborate with Dr. John Eaton and his research environment on imaging studies.

Brigham and Women's Hospital and Harvard Medical School, Boston, USA
Prof. Richard Blumberg is an important collaborator on Dr. Espen Melum's projects related to NKT cells. In addition, multiple projects in collaboration with Dr. Joshua Korzenik on PSC pathogenesis have been initiated in the context of the Resnek Family Center for PSC Research, a center, which is dedicated to discovering what causes PSC and developing and testing new therapies for this disease.

Japan
From 2024 we have intensified our collaboration with Japanese researcher Prof. Atsushi Tanaka at Teikyo University School of Medicine, Ass. Prof. Nobuhiro Nakamoto and Dr. Haruka Nakaharu at Keio University School of Medicine and Dr. Sachiko Kanei from University of Tokyo. Dr. Kanei is from October 2025 doing her research at NoPSC in Oslo. In addition, collaborations with Dr. Mashiro Shiokawa at Kyoto University on antibodies in PSC are ongoing.

Publications 2025

HIGHLIGHTED PUBLICATIONS

ElAbd H, Pesesky M, Innocenti G, **Chung BK**, Mahdy AKH, Kriukova V, Kulsvehagen L, Strobbe D, Stühler C, Mayr G, May DH, Prinzensteiner M, Steiert TA, Tran F, Hadjihannas MV, Günther R, Rosati E, Mucha S, Lieb W, Ziemann M, Dempfle A, Braun F, **Folseraas T**, **Hov JR**, **Melum E**, Bacher P, Sterneck M, Weismüller TJ, Lenzen H, Bokemeyer B, Howie B, Robins HS, Röcken C, Schreiber S, Khanna N, Pröbstel AK, Schramm C, Vogl T, **Karlsen TH**, Franke A (2025)
T and B cell responses against Epstein-Barr virus in primary sclerosing cholangitis Nat Med, 31 (7), 2306-2316

This study used multiple lines of experimental and clinical evidence to establish a novel link between Epstein-Barr virus (EBV) and PSC. EBV is a very common virus typically causing mild symptoms, but in some it can lead to a severe infection known as infectious mononucleosis (mono). We showed that individuals who develop mono are nearly 5-times more likely to develop PSC. These findings suggest that EBV plays an important role in PSC and that limiting mono may reduce PSC development.

Chung BK, **Jördens MS**, **Øgaard J**, Reims HM, **Flateland B**, Luedde T, **Jiang X**, **Karlsen TH**, **Melum E** (2025)
Multimodal transcriptomics identifies metallothionein as a novel pathway in primary sclerosing cholangitis
Hepatology, 83 (5), 1066-1081

This multimodal study utilized spatial transcriptomics on the largest cohort of PSC explant livers to date, to better understand disease pathways in PSC. Spatial transcriptomics with single-nuclei RNA sequencing showed that the metallothionein pathway in hepatocytes at the parenchyma-fibrosis interface was greatly increased in PSC. We confirmed these findings using a DDC mouse model of PSC. Our results highlight the importance of dissecting molecular pathways within the liver and suggest that metallothionein-associated pathways may be important in the pathogenesis of PSC.

Fossdal G, **Braadland P**, **Hov JR**, Husebye ES, **Folseraas T**, Ueland PM, Ulvik A, **Karlsen TH**, Berge RK, **Vesterhus M** (2025)
Mitochondrial dysfunction and lipid alterations in primary sclerosing cholangitis Scand J Gastroenterol, 60 (2), 165-173

Mitochondrial dysfunction may interfere with the energy metabolism of cells, and reports have linked this to various chronic liver diseases. Previous studies also indicate that cholestasis, which is a common feature in PSC, may directly impair mitochondrial function. In this study we analyzed lipid levels, fatty acid profiles and metabolites involved in mitochondrial metabolism, in blood and liver biopsies from people with PSC compared to people with other liver diseases. Our findings showed that the fatty acid profiles were altered and the energy metabolism was impaired in people with PSC. Particularly in those who had cholestasis, and the changes were associated with poor prognosis. This could indicate that mitochondrial dysfunction may be involved in driving the liver disease in PSC and could be a potential therapeutic target.

Breder S, Villard C, Eide E, Wang B, **Engesæter LK**, Reims HM, **Hov JR**, **Melum E**, **Aabakken L**, Line PD, Lømo J, Grzyb K, Wiencke K, Bergquist A, **Folseraas T** (2025)
A retrospective evaluation of preemptive liver transplantation for bile duct dysplasia in primary sclerosing cholangitis: Balancing risks and benefits JHEP Rep, 7 (12), 101598

Individuals with primary sclerosing cholangitis (PSC) are at increased risk of developing bile duct cancer. In precancerous stages (bile duct dysplasia), liver transplantation (LT) may prevent progression to advanced, incurable cancer. In our evaluation of 512 PSC patients who underwent LT for PSC, we found that the low diagnostic accuracy and unpredictable detection of mild dysplasia support a cautious, individualized approach to LT in precancerous stages of PSC, while more advanced dysplasia remains a valid indication for LT.

Molinaro A, **Engesæter LK**, Jorns C, Nordin A, Rasmussen A, Line PD, Pall V, Ericzon BG, Bennet W, **Hov JR**, **Melum E** (2025)
Outcome of Liver Retransplantation in Patients With Primary Sclerosing Cholangitis Liver Int, 45 (1), e16214

Primary sclerosing cholangitis (PSC) is one of the leading indications for liver transplantation, but disease recurrence and graft failure may necessitate re-transplantation. This Nordic registry-based study compared outcomes following re-transplantation in 185 PSC patients versus 208 patients with other aetiologies. The outcome of re-transplantation for PSC was better or comparable to a relevant comparison group both in terms of graft and patient survival. Specifically, patients deemed to undergo re-transplantation for presumed recurrent PSC had outcomes similar to non-PSC patients. The findings support re-transplantation as a viable therapeutic option with favorable outcomes in PSC patients with graft failure.

OTHER RESEARCH ARTICLES FROM NoPSC

Mol B, van Nieuwamerongen M, van Munster K, Färkkilä M, **Folseraas T**, **Tjønnfjord SKV**, **Hov JR**, **Boberg KM**, **Vesterhus M**, **Jørgensen KK**, Bergquist A, Goet J, de Vries A, van der Meer A, Weersma R, Inderson A, Bogaards J, Ponsioen CY, IPSCR study group (2025)
Proctocolectomy with permanent ileostomy is associated with improved transplant-free survival in patients with PSC
JHEP Rep 22;8 (3), 101700

Bajer L, Polakovicova P, Heczkova M, **Holm K**, **Hole MJ**, Hlavaty M, Bohdanecka A, Drastich P, Tichanek F, Meyer-Myklestad MH, Medhus AW, Reikvam DH, **Jørgensen KK**, Brezina J, Macinga P, Wohl P, **Hov JR**, Cahova M (2025)
Geography-independent mucosal microbiota alterations in primary sclerosing cholangitis persist after liver transplantation
JHEP Rep, 8 (4), 101716

Yaqub S, Busund S, Smedman TM, Syversveen T, Khan A, Solheim JM, **Folseraas T**, **Wiencke K**, Lassen K, Dueland S, Line PD (2025)
Liver transplantation for locally advanced non-resectable intrahepatic cholangiocarcinoma treated with neoadjuvant therapy: early results from the TESLA trial
Br J Surg, 112 (3)

Holmer M, Ingre M, Färkkilä M, Ponsioen C, Mol B, Schramm C, **Folseraas T**, **Wiencke K**, Cazzagon N, Catanzaro E, Molinaro A, Nilsson E, Vessby J, Kechagias S, Nyhlin N, Werner M, Bergquist A (2025)
Cirrhosis and age are key determinants of HCC risk in individuals with primary sclerosing cholangitis: A multicenter longitudinal cohort study
Hepatology, 83 (1), 21-29

Zhu C, Boucheron N, Al-Rubaye O, **Chung BK**, Thorbjørnsen LW, Köcher T, Schuster M, Claudel T, Halilbasic E, Kunczer V, Muscate F, Cavanagh LL, Waltenberger D, Lercher A, Ohradanova-Repic A, Schatzlmaier P, Stojakovic T, Scharnagl H, Bergthaler A, Stockinger H, Huber S, Bock C, Kenner L, **Karlsen TH**, Ellmeier W, Trauner M (2025)
24-Nor-ursodeoxycholic acid improves intestinal inflammation by targeting T_H17 pathogenicity and transdifferentiation
Gut, 74 (7), 1079-1093

Gaddipati S, Varsani A, de La Rosa G, Dominguez-Gil B, Colmenero J, Mendizabal M, Lorant T, Benoni H, Duus-Weinrich I, **Melum E**, Lempinen M, Jacquelinet C, Santin G, Jens AJT, Karp S, Reese PP, Goldberg DS (2025)
Age-stratified Data Highlight Worldwide Variability in Organ Donation Rates and the Potential Increase in Organ Donation
Transplantation 110 (3), e707-e714

Hansen SH, **Maseng MG**, Grännö O, Vestergaard MV, Bang C, Olsen BC, Lund C, Olbjørn C, Løvlund EE, Vikskjold FB, Huppertz-Hauss G, Perminow G, Yassin H, Valeur J, Aass Holten KI, Henriksen M, Bengtson MB, Ricanek P, Opheim R, Boyar R, Torp R, Frigstad SO, Aabrekk TB, Detlie TE, Kristensen VA , Strande V, Hovde Ø, Asak Ø, Jess T, Franke A, Halfvarsson J, Høivik ML, **Hov JR** (2025)
Fecal Microbiome Reflects Disease State and Prognosis in Inflammatory Bowel Disease in an Adult Population-Based Inception Cohort
Inflamm Bowel Dis, 31 (8), 2066-2080

Mahdy AKH, Schöpfel V, Huppertz-Hauss G, Perminow G, Tran F, Bang C, **Hov JR**, Bengtson MB, Ricanek P, Opheim R, Aabrekk TB, Detlie TE, Kristensen VA, Poyet M, Høivik ML, Franke A, ElAbd H (2025)
Simultaneous profiling of the blood and gut T and B cell repertoires in Crohn's disease and symptomatic controls illustrates tissue-specific alterations in the immune repertoire of individuals with Crohn's disease
Front Immunol, 16, 1638522

Vatn SS, **Hansen SH**, Tannæs TM, Brackmann S, Olbjørn C, Bergemalm D, Keita ÅV, Gomollon F, Detlie TE, Kalla R, Satsangi J, Jahnsen J, Vatn MH, Halfvarson J, **Hov JR**, Ricanek P, Moen AEF, IBD-Character Consortium (2025)
Microbial Patterns in Newly Diagnosed Inflammatory Bowel Disease Revealed by Presence and Transcriptional Activity - Relationship to Diagnosis and Outcome
Clin Exp Gastroenterol, 18, 103-119

Haaker MW, Chang JC, **Chung BK**, Pieper TS, Noé F, Wang T, Geijsen N, Houweling M, Wolfrum C, Vaandrager AB, **Melum E**, Spee B, Helms JB (2025)
Cellular Crosstalk Promotes Hepatic Progenitor Cell Proliferation and Stellate Cell Activation in 3D Co-culture
Cell Mol Gastroenterol Hepatol, 19 (5), 101472

Vestad B, **Hanzely P**, Karaliūtė I, **Ramberg O**, Skiecevičienė J, Lukoševičius R, Bjørnholt JV, **Holm K**, Kupčinskas J, Rasmussen H, **Hov JR**, **Melum E** (2025)
Modulation of Dextran Sodium Sulfate-Induced Colitis in Germ-Free Mice by *Enterococcus faecalis* Monocolonization
Microorganisms, 13 (12)

Hanzely P, **Holm K**, Bjørnholt JV, **Melum E**, **Hov JR**, Rasmussen H (2025)
Efficacy of oral and rectal administration of human faecal microbiota transplant (FMT) in human microbiota-associated mouse models
Sci Rep, 15 (1), 45099

Elias JE, Debela M, Sewell GW, Stopforth RJ, Partl H, Heissbauer S, Holland LM, **Karlsen TH**, Kaser A, Kaneider NC (2025)
GPR35 prevents osmotic stress induced cell damage
Commun Biol, 8 (1), 478

Jørgensen SF, **Braadland PR**, Ueland T, Fraz MSA, Michelsen AE, **Holm K**, Osnes LT, Trøseid M, Ueland PM, Fevang B, Aukrust P, **Hov JR** (2025)
Tryptophan-kynurenine metabolites associate with inflammation and immunologic phenotypes in common variable immunodeficiency
J Allergy Clin Immunol, 156 (3), 814-824.e11

Bai X, Raju SC, Knudsen AD, Thudium RF, Arentoft NS, Gelpi M, Heidari SL, Kunisaki KM, Kristiansen K, **Hov JR**, Nielsen SD, Trøseid M (2025)
Microbiome profiling reveals gut bacterial species associated with rapid lung function decline in people with HIV
Front Immunol, 16, 1555441

Skarpengland T, Tveita AA, Berntsen CF, Christensen EE, Macpherson ME, Stiksrud B, Hermansen NO, Niehusmann P, **Oldereid TS**, Stjernstrøm E, Brekke H, Nielsen HV, Pettersen FOD (2025)
Neurosarcocystosis in Patient with HIV-Induced Immunodeficiency
Emerg Infect Dis, 31 (3), 617-619

Mikaeloff F, Gelpi M, Escós A, Wang T, Gupta S, Olofsson A, Akusjärvi SS, Schuster S, Naval P, Sood V, Nikouyan N, Knudsen AD, **Vestad B**, Høgh J, **Hov JR**, Benfield T, Trøseid M, Pawar V, Rucevic M, Benfeitas R, Végvári Á, O'Mahony L, Savai R, Björkström NK, Lourda M, de Magalhães JP, Weiss S, Mardinoglu A, Varshney MK, Karlsson AC, Syed YA, Nielsen SD, Neogi U (2025)
Host Plasma Microenvironment in Immunometabolically Impaired HIV Infection Leads to Dysregulated Monocyte Function and Synaptic Transmission Ex Vivo
Adv Sci (Weinh), 12 (16), e2416453

Kaarbø M, Yang M, Meyer-Myklestad MH, Sundaram AYM, de Sousa MML, Sharma A, Medhus AW, Dyrhol-Riise AM, Kvale D, **Hov JR**, Aukrust P, Bjørås M, Reikvam DH (2025)
Transcriptomic and proteomic profiling reveal immune and metabolic dysregulation in the colonic mucosa of people living with HIV with incomplete immune recovery
Front Immunol, 16, 1635523

Ullern A, **Holm K**, Andresen NK, Røssevold AH, Bang C, Naume B, **Hov JR**, Kyte JA (2025)
Gut microbiota diversity is prognostic in metastatic hormone receptor-positive breast cancer patients receiving chemotherapy and immunotherapy
Mol Oncol 20 (2), 511-523
Nendl A, Raju SC, **Braadland PR**, Nordborg A, Bratseth V, Broch K, Jørgensen SF, Aukrust P, Kristiansen K, **Hov JR**, Trøseid M, Awoyemi A (2025)
Circulating metabolites in patients with chronic heart failure are not related to gut leakage or gut dysbiosis
PLoS One, 20 (9), e0331692

Dahl TB, Aftab F, Prebensen C, Berdal JE, Ueland T, Barratt-Due A, Riise AMD, Ueland PM, **Hov JR**, Trøseid M, Aukrust P, Gregersen I, Myhre PL, Omland T, Halvorsen B (2025)
Imidazole propionate is increased in severe COVID-19 and correlates with cardiac involvement
J Infect, 90 (6), 106494

Lammi V, Nakanishi T, Jones SE, Andrews SJ, Karjalainen J, Cortés B, O'Brien HE, Ochoa-Guzman A, Fulton-Howard BE, Broberg M, Haapaniemi HH, Kanai M, Pirinen M, Schmidt A, Mitchell RE, Mousas A, Mangino M, Huerta-Chagoya A, Sinnott-Armstrong N, Cirulli ET, Vaudel M, Kwong ASF, Maiti AK, Marttila MM, Posner DC, Rodriguez AA, Batini C, Minnai F, Dearman AR, Warmerdam CAR, Sequeros CB, Winkler TW, Jordan DM, Rešcenko R, Miano L, Lane JM, Chung RK, Guillen-Guio B, Leavy OC, Carvajal-Silva L, Aguilar-Valdés K, Frangione E, Guare L, Vergasova E, Marouli E, Striano P, Zainulabid UA, Kumar A, Ahmad HF, Edahiro R, Azekawa S; **Long COVID Host Genetics Initiative**; FinnGen; VA Million Veteran Program; MexGen-COVID Initiative; DBDS Genomic Consortium; GEN-COVID Multicenter Study; PHOSP-COVID Collaborative Group; GENCOV Study; Estonian Biobank Research Team; et al. (2025)
Genome-wide association study of long COVID
Nat Genet 57 (6), 1402-1417

Banales JM, Rodrigues PM, Affò S, Andersen JB, Aspichueta P, Boulter L, Bridgewater J, Calvisi DF, Cardenas A, Cardinale V, Carpino G, Coulouarn C, Dopazo C, Edeline J, Fabris L, **Folseraas T**, Forner A, Goeppert B, Heikenwalder M, Kendall TJ, Khan SA, Klümpen HJ, Koerkamp BG, Lamarca A, Lindsey S, Lleo A, Luedde T, Macias RIR, Morement H, Nault JC, Olaizola P, Perugorria MJ, Raggi C, Rimassa L, Saborowski A, Valle JW, Vithayathil M, Vogel A, Braconi C; International CCA Consensus Consortium (2025)
Cholangiocarcinoma 2026: status quo, unmet needs and priorities
Nat Rev Gastroenterol Hepatol, 23 (1), 65-96

REVIEW ARTICLES

Kolev M, Kremer AE, Sokollik C, Gershwin ME, Beretta-Piccoli BT, Andrade RJ, Bobzin C, de Boer Y, de Martin E, Deganello A, Heneghan M, Hirschfield G, Invernizzi P, **Karlsen TH**, Lanzavecchia A, Lohse AW, Longhi MS, Lucena MI, Manns M, Mitchell-Thain R, Münz C, Recher M, Samyn M, Salvioni D, Thiel IV, Trauner M, van Rheenen P, Zen Y (2025)
Unmet needs in autoimmune liver diseases
Curr Opin Immunol, 95:102565

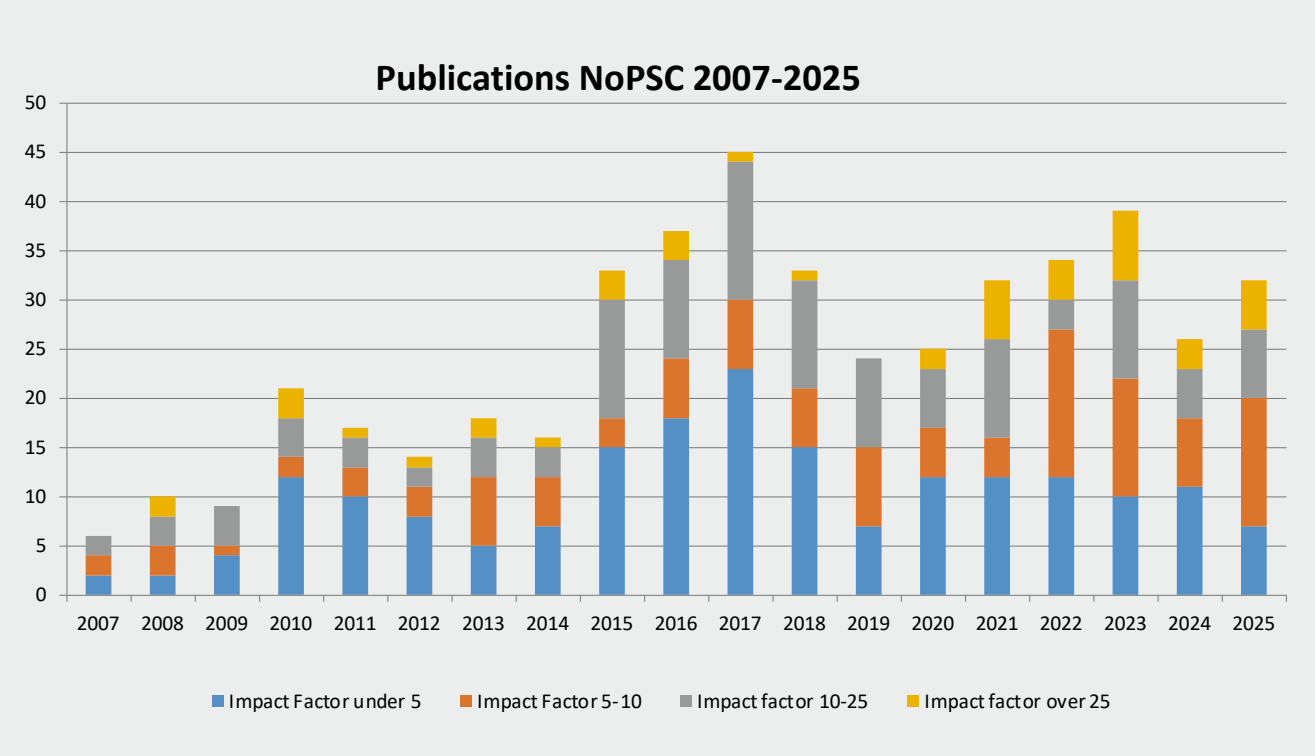
Karlsen TH, Murray F, Filippidis FT, Meijer M, Jha P Waldemar G, Macintyre E (2025)
Opportunities for European medical societies within the European Global Health strategy
Lancet Reg Health Eur, 50, 101244

Ellmeier W, Meijer M, Madrignani M, Simulescu L, **Karlsen TH**, Macintyre E, members of the BioMed Alliance Health Research Committee (2025)
Shaping the future of European health research: policy recommendations of the Biomedical Alliance in Europe for Framework Programme 10 and beyond
FEBS Lett, 599 (12), 1625-1633

Assis DN, **Hov JR** (2025)
Phase II clinical trials in primary sclerosing cholangitis: Making the most of every opportunity?
J Hepatol, 84 (1), 13-15

Manns MP, Bergquist A, **Karlsen TH**, Levy C, Muir AJ, Ponsioen C, Trauner M, Wong G, Younossi ZM (2025)
Primary sclerosing cholangitis
Nat Rev Dis Primers, 11 (1), 17

Blue Experimental Hepatology Group
Red Genomics and Metagenomics Research Group
Green Clinical Liver Research Group, Oslo
Purple Clinical Liver Research Group, Bergen
Orange Clinical Liver Research Group, Ahus
Brown Tom Hemming Karlsen



NOPSC

Division of Surgery and Specialized Medicine
Oslo University Hospital, Rikshospitalet
P.O. Box 4950 Nydalen, 0424 Oslo, Norway

www.ous-research.no/nopsc
www.med.uio.no/klinmed/english/research/centres/nopsc/index.html

Oslo University Hospital

UiO : University of Oslo