ANNUAL REPORT 2025

The Intervention Centre

OSLO UNIVERSITY HOSPITAL

QUALITY SYSTEM CERTIFICATION DNV ISO 9001

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«It remains our aim that all patients receive the best and most appropriate research-based investigations and interventions, in a dignified and professional atmosphere. Thank you to all staff members, collaborating departments, international colleagues, and valued industry partners.»

Letter by the head of department

I am proud to present our Annual Report for 2025. The Intervention Centre had another good year, and this report captures the output from our clinical activity, research, innovation and industry collaboration.

Activity increased across the Centre, with clinical activity rising by 12.1% compared with 2024. We performed 1,393 interventions and imaged 2,267 patients across the divisions of Oslo University Hospital. We achieved this despite only modest increases in resources, at a time when the hospital faces significant financial challenges. We also delivered 6,124 assistive devices for home treatment and maintained 16 active industry contracts. At the same time, we published 93 scientific articles, and six PhD candidates with main supervisors from the Centre defended their theses. All these results reflect hard work and strong commitment, and I would like to extend my heartfelt thanks to the entire staff.

As a transdisciplinary research and development department, we combine advanced technological infrastructure with close, everyday collaboration across the hospital, academia and industry. The Intervention Centre has drawn growing national and international attention, reflected in new research-based agreements with industry partners and our increasingly visible role in Oslo Science City. That interest also reaches into the operating theatres themselves, where we now broadcast an increasing number of our procedures live to auditoriums and remote audiences.

In 2025 this standing also earned formal recognition: the national EVALMEDHELSE evaluation rated us "internationally excellent" for research and publication quality, noting that our defining strength is the close integration of activities in everyday cooperation between clinicians and medical technologists. This integration rests on staff who are specially trained both in advanced medical technology and in the practical management of clinical studies and industry collaboration, expertise that goes far beyond ordinary perioperative operations.

The Centre is dedicated to shaping the future of healthcare, providing a toolbox for all clinical disciplines to develop and compare new treatment methods and to evaluate their social, economic and organizational consequences. Staying closely connected to the clinical divisions is essential to this. We hold regular user meetings, and our advisory board, made up of the heads of the clinical departments, prioritizes new project applications to ensure a fair and open distribution of the Centre's resources. In 2025 we had 61 ongoing projects and studies, with clinical research studies rising to 45. Robot-assisted surgery advanced markedly: through research collaborations with Medtronic and CMR Surgical we introduced the Hugo and Versius platforms, giving Oslo University Hospital a unique position in Norway operating across three robotic systems, with all procedures embedded in research protocols and our new RobReg registry. We were also selected as the national centre for MR-guided high-intensity focused ultrasound (MRgFUS) for essential tremor and tremor-dominated Parkinson's disease. In addition, artificial intelligence remains a central focus across our research groups, spanning from research through development to use in clinical practice.

As part of the Division of Technology and Innovation, we strengthened our research environment further in 2025 by integrating additional research expertise from the Department of Medical Technology. The Centre also continued to attract substantial external funding, including ongoing EU projects and new support from the Research Council of Norway with a budget of NOK 36 million.

In November we gathered to honour Professor Bjørn Edwin at a closing symposium celebrating his lasting impact on minimally invasive surgery and translational research. It was a fitting reflection of what this department stands for: dedicated people working together across disciplines to shape the future of healthcare. My sincere thanks again to the entire staff for a remarkable year.

Sincerely,

Mona-Elisabeth Rootwelt-Revheim

Head of Department and Professor
The Intervention Centre, Oslo University Hospital
Institute of Clinical Medicine, University of Oslo

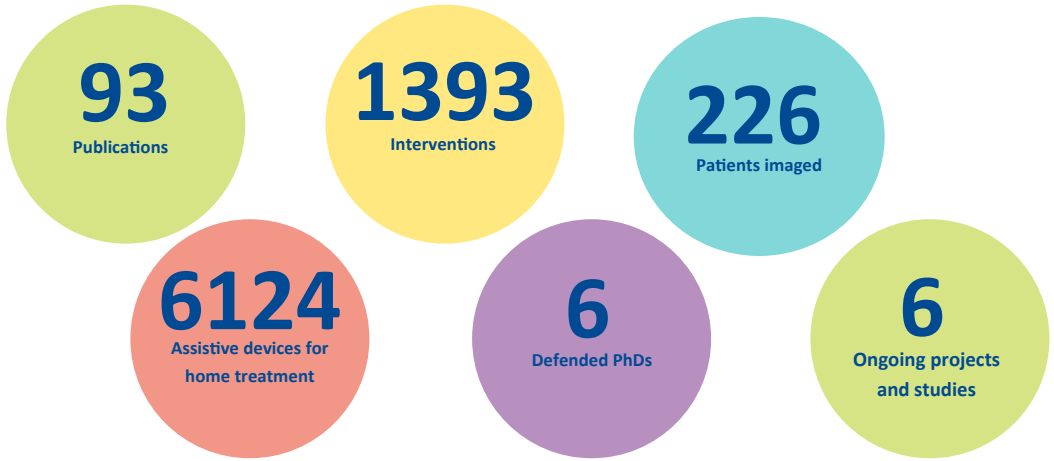
The department at a glance 2025

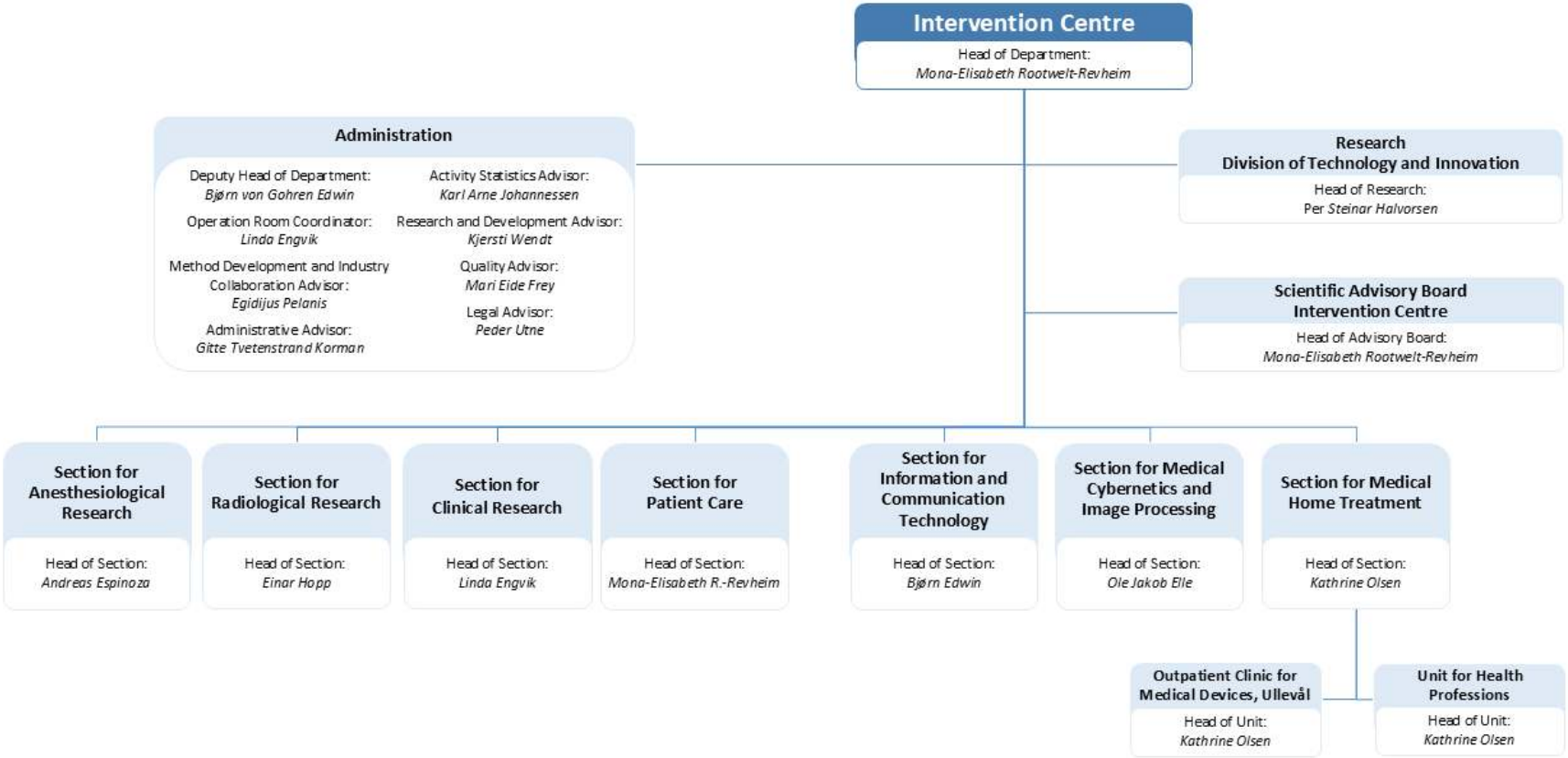
Organizational Map

The Intervention Centre (IVS) is an interdisciplinary clinical research and development department, as well as a provider of assistive devices, within the Division of Technology and Innovation (DTI) at Oslo University Hospital HF (OUH).

The Centre serves as a shared resource both within and outside of OUH in Norway and operates a testbed as a service for stakeholders on a global scale. The department also holds a certificate in accordance with the International Organization for Standardization's (ISO) 9001:2015 Quality Management Systems (QMS).

Offices, facilities, and staff are primarily based at Rikshospitalet (RH) and Ullevål Hospital (UH), with the latter dedicated to assistive devices.





Infrastructure and resources

Nine operating rooms equipped for technological, preclinical and clinical research

- Two multi modal/hybrid angio/videofluoroscopy operating rooms
- Two videoscopy operating rooms with mobile C-arm and surgical robots
- Two operating rooms with surgical microscope and navigation equipment adjacent to MRI
- Two multi modal/hybrid operating rooms with possibilities for intraoperative CT
- One preclinical operating room

The multimodal ORs are unique and not available elsewhere in the hospital. Thus, the Intervention Centre offers capacity for treatments where this unique combination of modalities is required.

ICT infrastructure for data extraction and transfer from the operating rooms

As a cross-disciplinary toolbox for new treatment methods, the Intervention Centre engages in extensive artificial intelligence (AI) research, covering diagnostics, planning, intraoperative guidance, treatment, and postoperative monitoring.

We generate patient data from our hybrid ORs across specialties and interventions. The Centre utilizes AI on multimodal data from diverse sources, including image volume data (CT and MRI), video recordings (laparoscopic 2D/3D, ultrasound and fluoroscopy), time-series data (hemodynamic monitoring signals), and unstructured data from patient records. The Intervention Centre has its own Research PACS and a dedicated AI server for training in-house developed AI models.

Training of clinical personnel, patients in the use of devices, and courses

The IVS integrates technological solutions into training modules, with a highly experienced and qualified staff. It offers hands-on experience for students and researchers across educational levels and professional fields. Collaborations with industry leaders (e.g. Siemens Healthineers) in clinical training and research lead to benchmark programs (e.g. the optimization of the trans-catheter valve care pathway).

Staff who can handle the complex infrastructure for research and devices

We have a transdisciplinary and international research environment that integrates clinical and technological expertise, underpinned by strong academic affiliations, high scientific output, and close industry collaboration embedded in our daily research and innovation activities.

Our multidisciplinary workforce spans healthcare, technology, and advisory domains. Clinical staff and related professionals include medical specialists (surgery, anesthesiology, nuclear medicine, and radiology), nurses (operating, anesthesia, and case management), radiographers (CT, MR, and interventional radiology), and laboratory technicians, supported by clinicians from collaborating hospital divisions. Technical staff include engineers in mathematics, computer science, informatics, and medical technology. Advisory competencies cover medicine, economics, policy, management, social sciences, education, ICT, and legal expertise.

In 2025, we maintained academic affiliations with four universities (UiO, NTNU, OsloMet, and BI), comprising 6 professors, 2 emeriti, and 4 associate professors, as well as 4 senior research physicians, 5 researchers, 7 postdoctoral fellows, and 9 PhD fellows; ~35 externally funded PhD and postdoctoral fellows were affiliated.

The average effective FTE was ~75 (permanent and temporary staff), with 55% male and 45% female staff. Of these, 19 handled the demand for medical technical equipment (assistive devices), with consumables, for home-based patients across the entire Oslo region.

Figure 1. In 2025, the department features staff from 27 nationalities.

Our department has a truly international workforce, with staff representing 27 countries across four continents: Europe, Asia, the Americas and Africa.This diversity integrates a wide range of perspectives, expertise and professional traditions, fostering a dynamic environment for knowledge exchange, collaboration, and innovation. We regard this as a key strength that drives excellence across all areas of our work.

Deliverables and statistics

Vision as summarized

Leading global health innovation through novel research, advanced technology, and clinical excellence

Deliverables overview

- Promote patient healthcare through research, development, testing and collaborations
- Operate advanced ORs as a shared resource in the hospital and provide assistive devices
- Develop, test and establish new healthcare services backed by technological solutions
- Position the centre as a global leader in research, innovation, simulation and education
- Facilitate developments in new healthcare services through public-private partnerships

Performance indicators

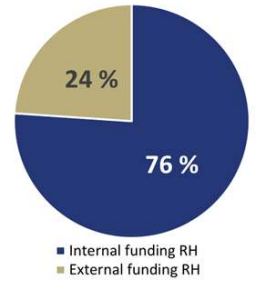
We prioritize monitoring our performance through indicators to ensure high quality in our deliveries and services, continuous improvement and safety. Next are some of the key areas that we focus on:

- Budget results
- Gross full-time
- Method development
- Transdisciplinarity
- Surgical procedures
- Imaging procedures
- Turnover time
- Cancellations
- OR utilization
- Treatment aids
- Projects & studies
- Publications
- PhD degrees
- Industry contracts
- Incidents & complaints
- Audits & certificate
- Satisfaction scores
- Benchmarking

Key results statistics

Internal funding	The Intervention Centre, Rikshospitalet		The Intervention Centre, Ullevål Hospital	
Category	Actuals share	Budget share	Actuals share	Budget share
Operating expenses	16.64%	13.01%	98.21%	90.16%
Personnel expenses	88.39%	86.99%	9.13%	9.84%
Total share of the income	105.02%	100.00%	107.34%	100.00%

Table 1. Internal funding of the department by location: actuals vs. budget in shares of the income 2025.



External funding of The Intervention Centre, Rikshospitalet	Share
The Research Council of Norway	30.83%
South-Eastern Norway Regional Health Authority	40.26%
European Union	21.35%
Testbed (Industry Collaboration)	7.57%
Total share	100.00%

Table 2. External funding of research by source at the department 2025.

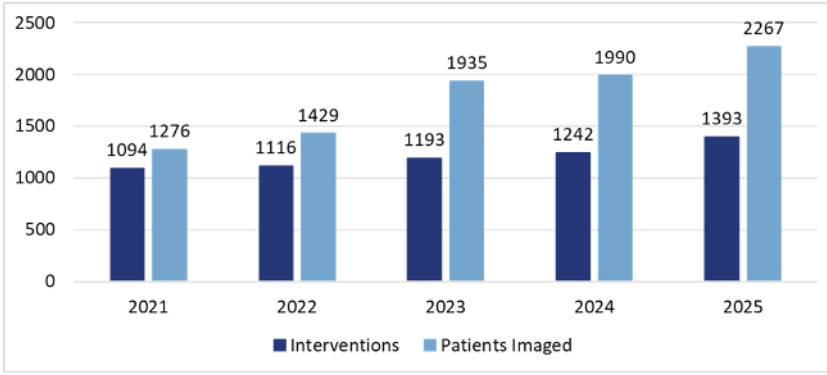


Figure 2. Number of interventions performed and patients imaged at the department 2021-2025.

Distribution of interventions and time spent in ORs at the Intervention Centre across Oslo University Hospital divisions	Interventions			Hours		
	Number		Share	Number		Share
	Change	2025	2025	Change	2025	2025
Cardiovascular and Pulmonary Diseases	+	828	59.44%	+	1 469	38.21%
Clinical Neuroscience	+	195	14.00%	+	1 123	29.22%
Gynecology and Obstetrics	+	2	0.14%	+	7	0.19%
Orthopedic Surgery	-	34	2.44%	-	191	4.97%
Paediatric and Adolescent Medicine		5	0.36%	+	15	0.40%
Surgery and Specialized Medicine	+	329	23.62%	-	1 038	27.00%
Total sum	+	**1 393**	**100.00%**	+	**3 843**	**100.00%**

Table 3. Distribution of interventions and hours spent in the ORs across hospital divisions in 2025. The changes are compared to 2024 numbers, with (+) indicating an increase and (-) indicating a decrease.

Figure 3. DRG-points and revenue generated from interventions performed 2021-2025 as well as distribution of operating room utilization divided into interventions / R&D (generating DRG Points, blue) and other R&D (not generating DRG Points, beige). Other R&D includes activities such as medical technology development utilizing hybrid OR technologies, preclinical studies, testbed activities as well as other industrial contracts requiring access to an OR. Industrial agreements deliver activities in both categories.

Deliverables and statistics

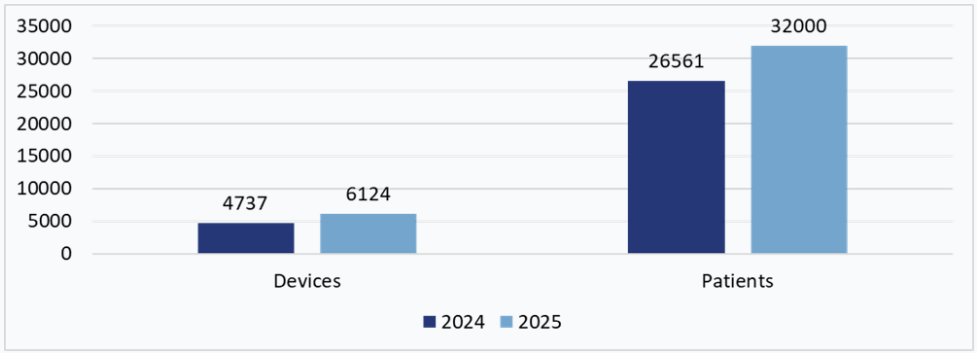


Figure 4. Number of assistive devices distributed and patients with devices at home in 2024 and 2025.

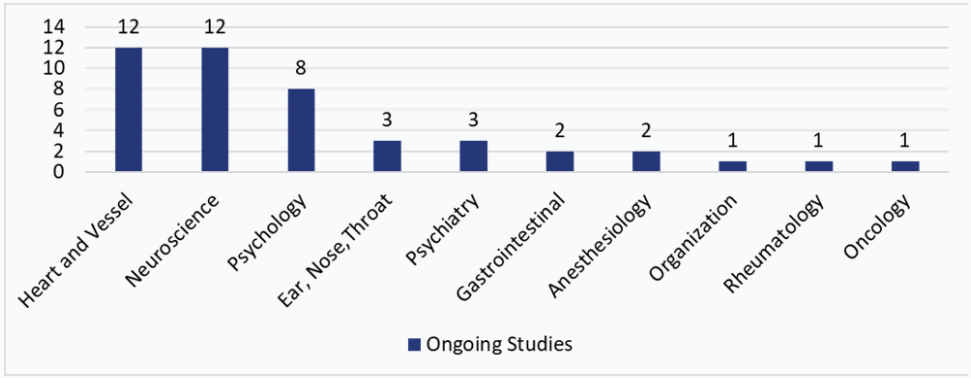


Figure 5. Number of ongoing clinical studies at the department in 2025 sorted by area of expertise.

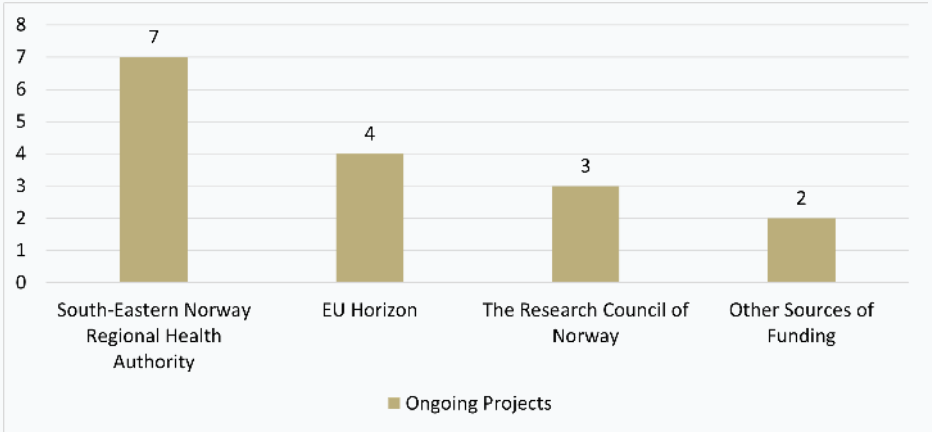


Figure 6. Number of ongoing research projects at the department in 2025 sorted by financial source.

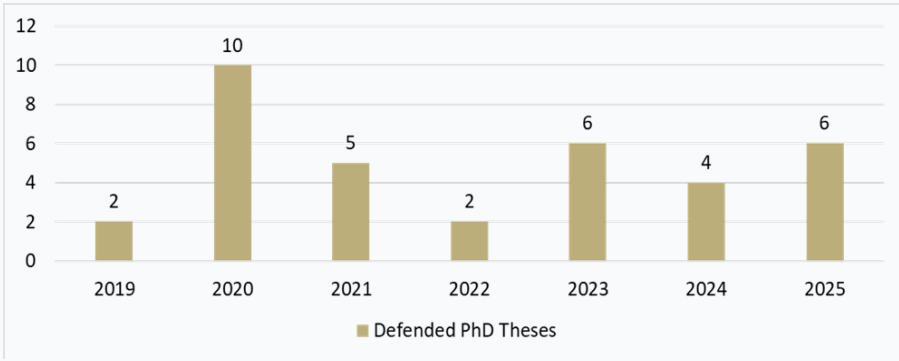


Figure 7. Number of defended PhD theses with main supervisors from the department in 2019-2025.

Pravda Jith Ray Prasad
PhD 07.02.2025
Photo: Private

Maryamalsadat Mahootiha
PhD 10.04.2025
Photo: Øystein Horgmo

Matthias Lippert
PhD 19.06.2025
Photo: Øystein Horgmo

Luca Boretto
PhD 27.10.2025
Photo: Birgit Solhaug

Ali Wajdan
PhD 13.11.2025
Photo: Birgit Solhaug

Ruoyan Meng
PhD 27.11.2025
Photo: Private

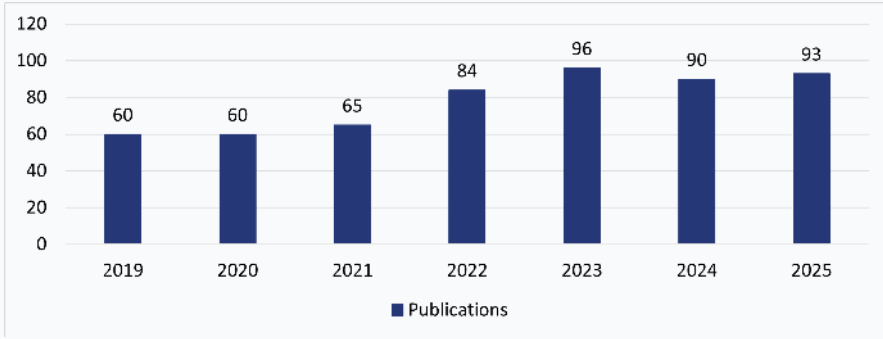


Figure 8. Total number of publications by the department in 2019-2025.

Priorities and developments

Robot assisted surgeries

In 2025, we began implementing two robot-assisted surgery platforms through an industry–academic research collaboration with Medtronic and CMR Surgical. The Medtronic Hugo system and the CMR Versius system are introduced to develop and evaluate advanced minimally invasive surgery. As part of this collaboration, formal study protocols are required for all procedures and are continuously prepared and submitted to the Regional Ethics Committee (REK) and the hospital's Data Protection Officer.

For Hugo, initial training took place in August, over four days at ORSI for three surgeons, two operating room nurses and one bedside surgeon. All had completed an electronic learning programme in advance, and the HPB surgeons also performed simulation-based training. Each surgeon was required to perform 12 robot-assisted procedures within 12 weeks to be certified. Later in the autumn, three additional surgeons (two transplant and one HPB) and three operating room nurses were trained. By the end of 2025, 34 patients had been operated on with Hugo at our institution.

The Hugo system was also introduced at the Radium Hospital, which already has extensive experience with robotic surgery. In August, three surgeons and three operating room nurses were trained, and 17 robot-assisted prostatectomies were performed during the year.

For the Versius system, surgeons and operating room nurses complete a digital training and simulation programme, followed by several days of on-site training at the hospital. The programme started in 2025, and the first procedure (a cholecystectomy) was performed on 11 December 2025.

A dedicated registry, RobReg, has been established to collect clinical and procedural data to support quality.

MRgFUS

In December 2025, "New Methods", the national system of managed introduction of new methods in the specialist health care service in Norway, decided the purchase and installation at The Intervention Centre of an Insightec Exablate Prime® system for transcranial MR-guided High intensity Focused Ultrasound at one of our MRI suites. We are proud to become the National Centre for the MRgFUS treatment of essential tremor and tremor-dominated Parkinson's disease in Norway. The planning and preparation for installation and use of the equipment was started immediately with important partners in neurosurgery, neurology, physics and anesthesia. This will also open for renewed activity in MR-guided treatment and research supported by international partners and our research groups.

Artificial Intelligence

Artificial intelligence continues to be a core research area at The Intervention Centre. In 2025, our research groups continued to develop and advance AI methods across a range of clinical and technological domains, including AI-based image analysis for minimally invasive surgery, multimodal AI for anomaly detection and decision support in biomedical communication systems, deep learning for cardiac event detection, and AI-driven medical software for surgical planning and precision medicine. This work spans multiple ongoing national and international projects, in close collaboration with academic and industry partners.

Granted applications

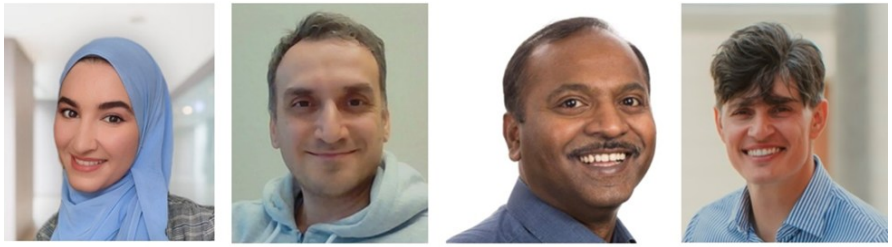
Advancing Smarter and More Meaningful Biomedical Communication Networks

Three Projects Totaling NOK 36 Million Awarded to Researchers at The Intervention Centre
Artificial intelligence (AI) is transforming healthcare by enabling data-driven diagnostics, treatment, monitoring, and drug discovery. A key emerging question is how sensors and imaging systems can transmit only the most relevant information for a specific task—reducing data volumes and resource use, while ensuring that critical information reaches clinicians quickly and reliably.
Four researchers from the Wireless Sensor Network Research Group, led by Prof. Ilangko Balasingham at The Intervention Centre, Division of Technology and Innovation, have secured three major grants from the Research Council of Norway to address this challenge.

SENSUS (Meaning-Centric Bio-Inspired Communication Systems), led by Dr. Mladen Veletic, challenges the traditional view that communication quality is defined solely by accuracy. The project investigates a meaning-centric, bio-inspired communication paradigm for intra-body biomedical applications, including validation of theories for targeted drug delivery.

SCOPE (Semantic Feature-Based Communication and Control for Wireless Body Sensor-Actuator Networks), led by Prof. Ilangko Balasingham and Dr. Mohammad Zoofaghari, applies semantic, meaning-aware communication to wireless body sensor-actuator networks. It will develop methodologies for resource-efficient intra-body communication, optimal resource allocation, real-time adaptability, and robust control.

SYNAPSE (SYnergetic Network-AI Platform for Semantic Efficiency), led by Dr. Roufaida Laidi, aims to create an AI-native ecosystem where distributed intelligence and network infrastructure co-evolve. In remote patient monitoring, SYNAPSE will enable networks that automatically recognize and prioritize life-critical data, ensuring urgent alerts are transmitted ahead of routine measurements.
Each project has been awarded NOK 12 million under the call Enabling Technologies: Renewal and Development of ICT, for a total of NOK 36 million. Together, these projects aim to transform biomedical communication by embedding semantic intelligence across multiple layers—from interpreting the meaning of signals within the body to deploying this intelligence across distributed digital health networks.



From left: Dr. Roufaida Laidi, Dr. Mohammad Zoofaghari, Prof. Ilangko Balasingham and Dr. Mladen Veletic

Collaborative involvement

Research

The IVS is actively involved in various regional, national and international research collaborations. These collaborations include minimally invasive surgery, robotic and laparoscopic liver resection, microwave ablation as well as AI within navigation, diagnostics and monitoring.

Key projects include the E-MIPS and E-MILS registries, which focus on pancreatic and liver surgeries, respectively, with numerous centres across Europe contributing data. We also participate in networking projects, open-source development projects, and EU-funded initiatives like HoloSurge and AMAZING-6G.

Additionally, we engage in exchange programs for healthcare professionals, such as the EAES fellowship in HPB surgery, and organize training and competency enhancement programs in collaboration with Medtronic both in HPB and TAVI procedures. We also organize training and competency enhancement programs for TAVI procedures in collaboration with Edwards Lifesciences, for which we are accredited as a centre of excellence.
The IVS's partnerships extend to universities and research institutions worldwide, including Harvard University, University of Pennsylvania, and KU Leuven. We collaborate with hospitals and clinical institutions like Singapore General Hospital and Cleveland Clinic and work with industry partners such as GE Healthcare, Medtronic, CMR Surgical, Edwards Lifesciences and Siemens Healthineers.
These collaborations aim to improve clinical outcomes, advance surgical techniques, and foster innovation in medical technology, demonstrating the Intervention Centre's commitment to global healthcare improvement.

Industry

Industrial collaborations and partnerships is an important part of the Intervention Centre and this has been successfully nurtured in 2025. We have received many inquiries sent both directly and indirectly, from various networks we are part of such as Nordic Proof and Nortrials MU.
In 2025, we had 16 active contracts with industry including facilitation of industrial international workshops, education material creation, preclinical trials and other clinic related projects. These active contracts were with the following companies: Cardiaccs, Edwards Lifesciences, GE Healthcare, Holocare, Medtronic, CMR Surgical, Siemens Healthineers, Sopra Steria.

Education

Students from various health professions have clinical training at the Intervention Centre for varying lengths of time. This includes students from environments as paramedics, medicine, anesthesia nursing, radiology, and surgical nursing. Students from engineering and computer science also participate in multiple projects at the Intervention Centre on a daily basis.

National and international professional training and experience exchanges are also organized for health care professionals under training or ones seeking additional guidance before establishing or improving their clinical practice. The facilities at The Intervention centre allows for a live video transmission with a two-way audio from the operating rooms to a large meeting room, which allows for discussions without the disturbance of the clinical workflows. The following meetings are organized as visits, workshops or international gatherings and are sponsored personally, by professional organizations or by a company.

User involvement

In 2025, projects at the Intervention Centre have involved the following organizations and user representatives:

User (or patient) involvement in the development of new medicine and clinical trials has become a critical component of modern healthcare research. User-involvement is mandatory in all clinical trials. The

background for this is that patients play a vital role in shaping clinical trial design, ensuring ethical

oversight, and improving recruitment and retention by making studies more patient-centred. They help make results more accessible to the public and are increasingly included in regulatory and policy decisions.

The benefits with user involvement are that it enhances the relevance and quality of research, builds trust

and transparency, and improves health outcomes by aligning studies with patient priorities.

Our patient representatives cannot be named due to privacy regulations. Various interest groups are also used for user involvement at the IVS. Some examples are: The Norwegian Association for Children with Congenital Heart Disease; The Norwegian Brain Tumor Association; The Norwegian Heart and Lung Patient Organization; The Norwegian Blood Cancer Association.

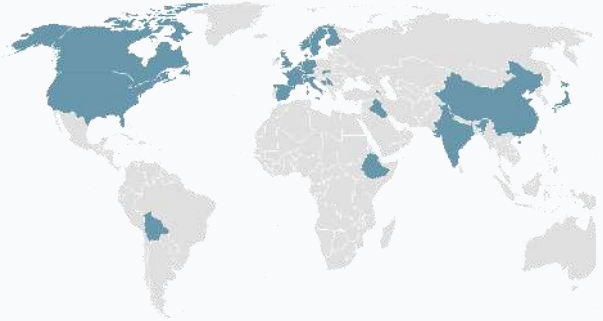


Figure 9. The Intervention Centre collaborates with researchers and research institutions all over the world: USA, Denmark, Canada, Germany, Spain, France, India, Finland, China, Belgium, United Kingdom, Italy, Switzerland, Netherlands, Singapore, Slovenia, Slovakia, Norway, Sweden, Armenia, Ethiopia, Bolivia, Iraq, Japan, South Korea, Bosnia and Serbia.

Highlights: annual overview

ISO-9001:2015 certification and recertification

December 2nd–3rd we conducted the recertification audit with DNV for the ISO 9001:2015 certification, and the audit was successful with IVS scoring 4 out of 5 on the focus area "Risk management – routines and practice for planning, execution, control, and correction during changes/start-up of new activities". The auditor highlighted many positive indications, including our new simplified risk matrix, strong cross-disciplinary collaboration, and the recently presented risk assessment for MR and HIFU at IVS.

We believe that together we now have an even clearer understanding of risk management, our processes, and how we document our work — and we will continue our good quality work as Team IVS.

Launch of a new research group: Medical Software Research Laboratory (MESH|Lab)

The Intervention Centre (IVS) has launched MESH|Lab, an interdisciplinary Medical Software Research Laboratory led by Rafael Palomar that unites software engineers, biomedical engineers, medical doctors, and students to advance open-source medical technologies and improve clinical outcomes.

MESH|Lab plays a leading role in the 3D Slicer community, spearheading the development of Slicer-Liver, the most comprehensive extension for liver therapy planning, and Slicer-SOFA, the first extension to bring medical simulations into the 3D Slicer platform. Palomar recently participated in the 42nd NA-MIC Project Week, where an international team worked to make Slicer-SOFA accessible across Windows, Linux, and MacOS via the Slicer Extensions Manager, while also exploring its integration with SlicerROS2 to enable simulated environments for AI applications such as surgical robotics and soft robotics design.

The collaboration between IVS and Inria, France, on Slicer-SOFA has been recognised through the Åsgard mobility program, funded by the French Institute of Norway and the Research Council of Norway, strengthening ties between the two institutions. Looking ahead, Rafael is participating in the 2025 SOFA Technical Committee meeting to help shape the future direction of the SOFA simulation library and its integration with 3D Slicer.

Award for outstanding original article

Congratulations to Matthias Lippert, Håvard Solvin, Ole Jakob Elle, and Henrik Brun for the award for an outstanding original article! The article is Cardiac anatomic digital twins: findings from a single national centre.

This is an example of good and innovative research at IVS in close and very good collaboration with central OUH environments.

Robots: Hugo and Versius

In August 2025, OUH reached a new milestone with the first robot-assisted laparoscopic procedures performed on the Hugo RAS platform. This marked a meaningful step beyond the Da Vinci-only era that began in 2004, when Bjørn Brennhovd performed Norway's first robot-assisted laparoscopic prostatectomy at Radium Hospital.

The first Hugo procedures — adrenal and prostate resections — were carried out at the Intervention Centre by teams led by Dyre Kleive and Kristoffer Brudvik, and at Radium Hospital by teams led by Lars F. Qvigstad and Shivanthe Sivanesan. All initial surgeries were successful. To prepare, the surgical teams completed an extensive training program including sessions at ORSI Academy in Belgium, and the first operations were supported by experienced robotic surgeons including Professor Matin Sheriff (Medway Foundation Trust), Bert Van den Bossche (Aalst) and Bjørn Brennhovd. Hugo RAS differs from Da Vinci in important ways: its modular design with four separate robotic arms offers flexibility but makes docking more complex, while its open console layout promotes communication among the surgical team, in contrast to the closed, immersive Da Vinci console.

In early 2026, OUH performed Norway's first procedure with the Versius robot from CMR Surgical at Ullevål — a successful cholecystectomy led by gastrointestinal surgeon Torgeir T. Søvik — marking the start of an R&D collaboration between the Department of Gastrointestinal Surgery, the Intervention Centre and CMR Surgical. With Versius now in use alongside Da Vinci and Hugo, OUH holds a unique position in Norway operating across three robotic platforms, and the partnership is embedded in research protocols that will expand from gallbladder surgery into upper GI, colorectal and advanced abdominal wall reconstruction procedures.

Both Hugo and Versius procedures at OUH are embedded in research studies that will measure the learning curve and assess whether the new platform can match Da Vinci's efficiency — including the under-five-minute docking times currently achieved with Da Vinci.

IVS and OUH is actively investing in industrial collaboration and innovation to realize the potential of its highly specialized surgical environments and to build a modern, forward-looking infrastructure for surgical research.

Highlights: annual overview

A strengthened research group:

The BioMedical Technology and Data Analytics group

The Oslo Bioimpedance and Medical Technology Group with Medical Robotics, Visualization and Navigation, is created and led by Professor Ole Jakob Elle. The merger combines deep expertise in bioelectrical measurement, sensor technology and medical visualization and robotic-assisted surgery. Together, the unified group strengthens the Intervention Centre's translational medical technology research and its position in major national and international initiatives.

IVS is part of TRUST

Oslo University hospital and The Intervention Centre are partner of TRUST - The Norwegian Centre for Trustworthy AI with Ole Jakob Elle as contact person. TRUST is one out of six national AI research centres funded by the Research Council of Norway (2025-2030), and led by the University of Oslo, SINTEF and the Norwegian Computing Centre (NR) . The research in TRUST is organised around 14 different fundamental AI research areas (RAs) to be matched with 14 Action Clusters where the fundamental AI research can be applied to use-cases to solve real-world challenges. We have the project "AI-enabled hybrid Digital Twin for Continuous Monitoring, Detection and Prediction" under Research Area – Hybrid Digital Twin and the Use-Case "Optimising Cardiac Care" under Action Cluster – Healthcare Technology, where the aim is to develop a continuous heart monitoring and decision support system to optimize heart failure treatment or find the optimal time for intervention in valve insufficiency.

TRUST

Closing symposium for Professor Bjørn Edwin

On 28 November 2025, the Intervention Centre at Oslo University Hospital hosted a closing symposium at Rikshospitalet's Green Auditorium to honour Professor Bjørn Edwin, bringing together surgeons, researchers, and industry partners across a half-day programme of tributes and scientific lectures. The event featured panel discussions reflecting on Edwin's career alongside high-level talks on topics central to his legacy — including endoscopy, liver and pancreatic surgery, living donor transplantation, surgical robotics, and artificial intelligence — with contributions from hospital leadership including Hospital Director Bjørn Atle Bjørnbeth. The programme closed with reflections on mentorship, academic supervision, and the path ahead for the field, underscoring Edwin's lasting impact on minimally invasive surgery and translational research at Oslo University Hospital.

Collaboration Agreement within OUH to increase the surgical capacity at IVS

IVS has, over the past 2–3 years, increased its surgical capacity by improving the planning and utilization of operating rooms; from 2022 to 2024, the number of procedures, interventional and radiological, increased by 27%. To further leverage our advanced infrastructure, limitations arose in staffing for key competencies, while there was still potential for increased use of available operating room space.

To increase the capacity of IVS operating rooms, the Technology and Innovation Clinic has entered into a collaboration agreement with the Heart and Lung Clinic (HLK), the Neuroscience Clinic (NVR), and the Orthopedic Clinic (OPK). As a result, resources have been reallocated from HLK, NVR, and internally within DTI/IVS to be used to increase the number of surgeries performed in IVS operating rooms.

Areas with increased activity are:

- Functional neurosurgery and surgery for degenerative spinal conditions
- Scoliosis surgery
- Transcatheter aortic valve implantation (TAVI)

The increase in activity started in September 2025 and has so far been successful.

Visits and events at the department

Jan 6: The Deanery at University of Oslo
Jan 15: C-suite visit from South-Eastern Norway Regional Health Authority , Oslo Science City, Norwegian Pharmaceutical Industry Association (LMI), Oslo Municipality
Jan 16-17: Siemens Healthineers
Jan 20: Medtronic
Feb 7: PhD defence (Pravda Jith Ray Prasad)
Feb 11: AstraZeneca
Feb 12: GE Healthcare
Feb 25: Edwards Lifesciences (TAVI-course)
Mar 4: Oslo Science City and Norwegian Pharmaceutical Industry Association (LMI)
Mar 7: Astra Zeneca
Mar 18: Physiotherapist students
Mar 21: Bronchoskopy forum Norway
Mar 26: The Future Patient Treatment Working Group
Apr 1: Innovation Skåne
Apr 10: PhD Defence (Maryamalsadat Mahootiha)

11 February (AstraZeneca)

12 February (GE Healthcare)

15 January— national C-suite visit

7 March (AstraZeneca)

22 May (Sykehuspartner)

Apr 23: Edwards Lifesciences
May 6: SINTEF Digital
May 8: Medtronic (TAVI-course)
May 14-16: Norwegian Thoraco-Laparoscopic Association (NTLF) (Laparoscopy-course)
May 20-21: Medtronic (HPB-course)
May 21: Leiden (ENT Surgery department)
May 22: Sykehuspartner and Department of Information Security at OUH
May 23: Oslo Science City
May 28: Sahlgrenska hospital
Jun 2: Philips Healthcare
Jun 3: Roche
Jun 4: University Hospital of North Norway
Jun 10: Physiotherapist students
Jun 11: Growth House at University of Oslo
Jun 12: CMR Surgical
Jun 19: PhD Defence (Matthias Lippert)
Jul 3: Edwards Lifesciences

28 May (Sahlgrenska hospital)

23 May (Idar Kreutzer and Christine Wergeland Sørbye)

3 June (Philips)

4 June (University Hospital of North Norway)

3 July (Edwards Lifesciences)

Visits and events at the department

Aug 22: Cochlear (Anthony Bishop President EMEA)
Aug 27-29: Medtronic: First Hugo RAS in Norway
Sep 2: Medtronic (Kendra Grubb CMO)
Sep 4: Siemens Healthineers (Syngo.via)
Sep 9: Innovation Norway
Sep 24-26: Norwegian Thoraco-Laparoscopic Association (NTLF) (Laparoscopy-course)
Oct 7: Physiotherapist students
Oct 15: BI and Michaela Kerrissey (Harvard)
Oct 17: CMR Surgical (Susanne Lehnberg)
Oct 21: Edwards Lifesciences (TAVI-course)
Oct 23: Intuitive (Henry Charlton CCMO)
Oct 27: PhD Defence (Luca Boretto)
Oct 28: Siemens Healthineers (Advanced Therapies)

22 august (Cochlear)

27 august (Medtronic)

4 September (Siemens Healthineers)

9 September
(Innovation Norway)

2 september
(Medtronic)

15 October
(Michaela Kerrissey and Bjørn Erik Mørk)

17 October (CMR Surgical)

21 October (Edwards Lifesciences course)

23 October (Intuitive)

Nov 4: Brækhus Law Firm
Nov 11: Medtronic (Hugo RAS)
Nov 13: PhD Defence (Ali Wajdan)
Nov 13: Medtronic (TAVI-course)
Nov 18-19: Medtronic (HPB-course)
Nov 25: Association for Medical Innovation (SMI) at University of Oslo
Nov 28: Bjørn Edwin seminar
Dec 9: Physiotherapist students
Dec 9: Intuitive (ION-robot)
Dec 10: Medtronic (Cranial & Spinal Technologies)
Dec 17: Royal Danish Embassy in Norway

4 November (Brækhus)

11 November (Medtronic visit—Surgical Research and Technology)

25 November (Association for Medical Innovation (SMI) at University of Oslo)

… and much more information can be found in our communication channels including our external webpage — www.ivs.no and LinkedIn page — The Intervention Centre

« It is both gratifying and impressive that it has been possible to deliver increasingly strong results when the hospital is facing significant financial challenges.»

Jan Olav Høgetveit

Organizational units presentation

Letter by the head of division (DTI)

A strong year for The Intervention Centre in 2025

There is much to be pleased about when looking back at 2025. Not only have the core tasks been delivered at a very high level, but the Centre has also managed to balance the highly demanding task of increasing clinical operations while at the same time maintaining—and even strengthening—research, industry collaboration, and fundraising.

The hospital has had a strong focus on increasing efficiency in patient care and treating more patients in line with the Government's initiative to reduce waiting lists. The Intervention Centre has done its part and has succeeded in increasing DRG-generating clinical activity by 16.1% in 2025 compared to 2024. This has been achieved despite only modest increases in available resources. High clinical activity at the Intervention Centre is also important for OUH, as technologically advanced operating rooms combined with highly skilled and experienced teams ensure high quality and efficiency in patient care.

At the same time, collaboration agreements have been established with industry partners covering a total of four surgical robots, including associated cross-location collaboration. We now have one robot each installed at both Ullevål and at the Radium Hospital, which is important for strengthening our presence across other OUH locations. In addition, agreement has been reached to establish a national centre for MRgFUS for essential tremor, representing an important expansion. In total, we now have 16 ongoing collaboration agreements with industry.

Research performance is also strong. The number of clinical research studies increased from 39 to 45 in 2025, we published 93 articles, and we were awarded funding for 3 out of 5 ICT applications submitted to the Research Council of Norway, as well as one EU application.

It is both gratifying and impressive that it has been possible to deliver increasingly strong results on all key performance indicators for the Intervention Centre during a period when the hospital is facing significant financial challenges. This is due to a combination of several factors, including ambitious goals, clear leadership, and dedicated employees who are willing to go the extra mile to achieve these goals.

The Intervention Centre is an internationally recognized centre for the development and implementation of minimally invasive technology and image-guided therapy. We must preserve and further develop this position, and I am confident that we both have the right team for the task and are on the right path.

Jan Olav Høgetveit

Head of The Division of Technology and Innovation, Oslo University Hospital

Administration

Head of department

Mona-Elisabeth Rootwelt-Revheim, MD, PhD, Professor

Employee list

Bjørn Edwin, Deputy Head of Department, MD, PhD
Egidijus Pelanis, Method Development and Industry Advisor, MD, PhD
Per Steinar Halvorsen, Head of Research, MD, PhD, Professor
Gitte Tvetenstrand Korman, Administrative Advisor, M.Phil.
Karl Arne Johannessen, Activity Statistics Advisor, Professor Emeritus, MD, PhD
Kjersti Wendt, Research and Development Advisor, Associate Professor, Nurse Anesthetist, PhD
Linda Engvik, Operation Room Coordinator, Nurse Operating Room, MSc
Mari Eide Frey, Quality Advisor, M.Phil.
Peder Heyerdahl Utne, Legal Advisor, Cand.Jur, M.Phil.

Deliverables

Administrative support
Follow up and maintain the Intervention Centre's administration: secretarial function for the department head, budget control and financial follow-up for the department and projects, personnel, purchasing, office functions.

Quality management systems
Advice and support within all areas of quality, patient safety, and in the cross-over to Health, Safety and Environment (HSE). Quality registries.

Method development
Overview, follow-up and impact evaluation related to method development at The Intervention Centre. Additionally, representation at the Method Council at Oslo University Hospital.

Industry collaborations
Organize and coordinate direct and indirect business collaboration, testbed activities and other contracts at the Intervention Centre together with clinical environments at OUH, Inven2, industrial players and Health2B.

Medical collaborations
Establish and maintain relevant medical collaborations with local, regional, national and international key opinion leaders and departments.

Legal support

Utilize our special advisor within legal aspects with special focus on industrial contracts and

collaboration with industry.

Activity monitoring support

Collect and analyze available activity data to optimize, monitor and report activities at the department level.

Operating room coordination

Receive requests and coordinate operating room activities to optimize both clinical and research activities.

Research administration and support:

Coordinate research and development activities including overview and reporting of research

activities. Maintaining research and development project registries. Research ethics advising.

Section for Clinical Research

Head of section

Linda Engvik, MSc head of section, OR nurse
Bjørn Edwin, MD, PhD, Professor, Medical advisor

Employee list

Sharon Tamson Andersen, Laboratory assistant
Ann Hege Andreassen OR nurse
Maria Luisa Creencia Carballo, Laboratory assistant
Randi Ingvild Ingvaldsen, OR nurse
Ida Kristin Monstad, OR nurse
Trude Aune Remøy, OR nurse
May Helene Toth, OR nurse
Gema Cabanillas Gordillo, OR nurse
Åsmund Avdem Fretland, MD, PhD, Consultant surgeon
Sarkis, Drejian, MD, PhD fellow
Ingrid Schrøder Hansen, MD, PhD Fellow

Deliverables

- Research and development in minimally invasive surgery (Laparocsopic surgery (LS) and Robotic assisted surgery (RAS)) at the Intervention Centre
- Development and education in new techniques at Oslo University Hospital and other hospitals in Norway
- Clinical R&D in all medical domains
- Perform minimally invasive treatment (LS/RAS) in patient groups where the volume of patients within these disease groups are too low to develop secure new treatment strategies on many sites
- Perform minimally invasive treatment (LS/RAS) of patient groups requiring established multi-professional collaboration and infrastructure currently uniquely found at the Intervention Centre. Examples are laparoscopic pancreas- and liver surgery, laparoscopic endocrine surgery and local ablation of liver malignances. From September some of these procedures have been done with RAS.

Objectives

- The section's activities focus on minimally invasive treatment in all surgical specialties
- The section shall be leading nationally and internationally with its focus area in R & D
- The section shall assist and initiate research on minimally invasive therapy projects
- The section promotes education locally, regionally, nationally and internationally
- The section stimulates multi-professional collaboration because:
- Minimally invasive therapy is a common field of interest across specialties performed in many professional settings by various specialists
- Minimally invasive therapy depends on development within technology and radiology

Section for Radiological Research

Head of section

Einar Hopp, MD, PhD, Consultant Radiologist

Employee list

Lisbeth Eriksen, Radiographer
Janne Fossen, Radiographer
Jorunn Fraser-Green, MSc, Radiographer
Åshild Gandrud, Radiographer
Kristoffer Hay, Radiographer
Jakob Adrian Hauen Holmgaard, Radiographer
Einar Hopp, MD, PhD, Consultant Radiologist
Hilde Korslund, MSc, Radiographer
Grethe Løvland, Radiographer
Luxman Manuel Pilai, Radiographer
Rachel Nygård, Radiographer
Kenneth Ottesen Pedersen, Radiographer
Seyed Mohammadmehdi Sadat Akhavi, Consultant Radiologist

Deliverables

- High Level Radiological diagnostics, support and service to all experimental and clinical projects at The Intervention Centre
- Radiological examinations of animals and patients treated at the Intervention Centre
- Advanced image guided treatment at The Intervention Centre
- Increase quality through research, development and refinement of radiological methods
- Training and supervision of healthcare personnel in new image-guided treatment techniques
- Research group in the field of MR guided High Intensity Focused Ultrasound Treatment
- Prepare the installation and startup of national service for transcranial MR guided High Intensity Focused Ultrasound Treatment

Objectives

- To be a national and international leading environment for image guided treatment
- Strengthen interdisciplinary research and increase number of regional, national and international joint projects
- Develop and adapt radiological methods to facilitate and develop image guided and minimally invasive procedures

Section for Anesthesiological Research

Head of section

Andreas Espinoza MD, PhD, Anesthesiologist

Employee list

Hilde L. Orrem, MD, PhD, Anesthesiologist
Per Steinar Halvorsen, MD, PhD, Professor, Anesthesiologist*
Janus Adler Hyldebrandt, MD, PhD, Anesthesiologist
Ole-Petter Dahl, Nurse anesthetist
Anton Amalathasan Josephmary, MSc, Nurse anesthetist
Guttorm Larsen, Nurse Anesthetist
Helen Littorin-Sandbu, Nurse Anesthetist
Elna Løvendahl Mogstad, MSc, Nurse Anesthetist
Gitte Lise Olsen, MSc, Nurse Anesthetist
Kjersti Wendt, PhD, Associate professor, Nurse Anesthetist *
Reidun Aarsnes, MSc, Nurse Anesthetist
Irene Fellie Bjaaland, Nurse Anesthetist and Intensive care

*Clinical affiliation

Deliverables

- Anesthesia service to all clinical and experimental projects at the Intervention Centre
- Development of new treatment modalities in interdisciplinary teams
- Training/supervision of healthcare personnel in anesthesia
- Innovation/DOFI/patents
- Research group in the field of cardiovascular monitoring

Objectives

- Contribute to improved quality of experimental and clinical research
- Contribute to method developments in interdisciplinary teams
- Have a high-qualified staff
- Interdisciplinary research and increase the number of joint projects
- Contribute to increased innovation and secure intellectual property

Section for Medical Cybernetics and Image Processing

Head of section

Ole Jakob Elle, MSc, PhD, Professor

Employee list

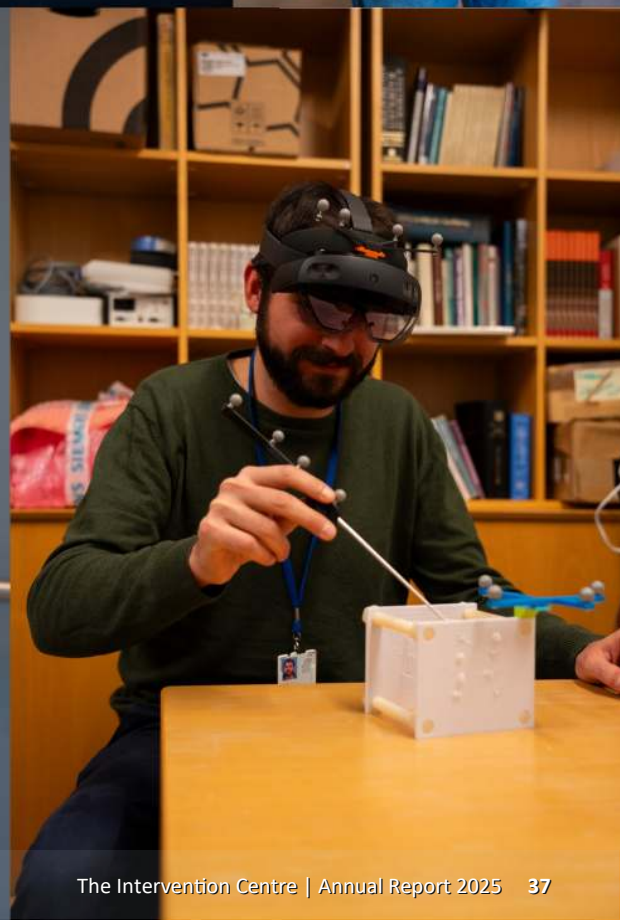
Rafael Palomar MSc, PhD, Associate Professor, Senior Researcher
Rahul P.K. Menon, MSc, PhD, Senior Researcher
Espen Remme, MSc, PhD, Senior Researcher
Luca Boretto, MSc, PhD Fellow
Ignas Kupcikevicius, MSc PhD Fellow
Vetle Christoffer Frostelid, MSc, PhD Fellow
Inger Grünbeck, MSc, PhD Fellow
Eirik G. Homlong, MSc, PhD Fellow
Varatharajan Nainamalai, MSc, PhD, Postdoc

Deliverables

- Support Common AI research infrastructure
- Provide data for research and training of AI-networks
- Support the South-Eastern Norway Regional Health Authority test-facility (Gateway)
- Research and development on new technological solutions supporting the whole chain in patient diagnostic and treatment such as minimally invasive surgery and catheter interventions.
- Technology provided for user interaction and information exchange in the operating suites;
- procedure planning; navigation and automation; patient monitoring peri-operatively with processing
- of multidimensional sensor/image - data; robotics and tele-manipulators
- Biomedical models and simulation technology intended for clinical decision support.
- Research, Development and training on Artificial Intelligence (AI) models, especially Machine learning (ML) and Deep Learning (DL) networks, in order to automate processes and make decision support systems
- Explore and develop methods within High Performance Computing (HPC) for fast processing of complex algorithms and large amount of data
- Initiate, coordinate or participate in national and internationally funded research projects as well as industrial collaborations
- Journal and conference publications
- Teach and supervise students and PhD fellows
- Produce new DOFIs/Innovations/Patents/Companies

Objectives

- Focus on new technological methods and solutions for: Planning and guiding surgical procedures; Monitoring patients during and after surgery
- Collaborate closely with various hospital clinicians by establish partnerships with leading research institutions and industry, both nationally and Internationally
- Become a nationally and internationally recognized research environment in selected technological areas
- Initiate and lead research-driven innovations and industrial collaborations
- Maintain in-depth knowledge in key areas, including: Medical informatics; Artificial intelligence (AI); Software engineering; Computer graphics and visualization; Signal, image, and video processing; Robotics, cybernetics, and mechatronics



Section for Information and Communication Technology

Head of section

Bjørn Edwin, MD, PhD, Professor, Medical advisor
Ilangko Balasingham, MSc, PhD, Professor

Employee list

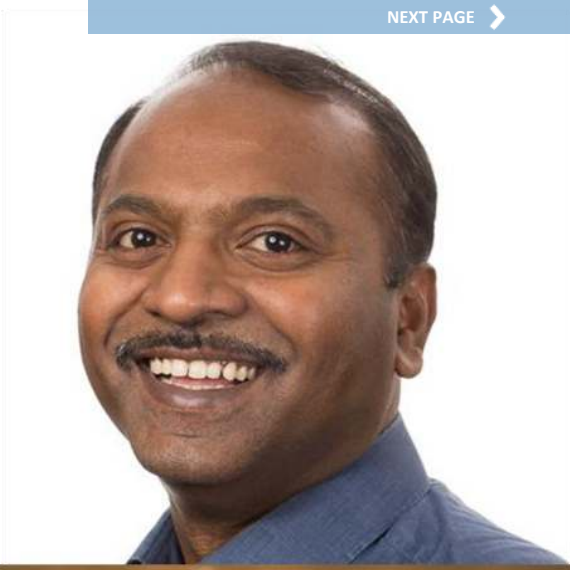
Mladen Veletic, MSc, PhD, Senior researcher
Hemin Ali Qadir, MSc, PhD, Researcher
Anders Grinden Vestengen, MSc, PhD Fellow
Jacob Bergsland, MD, PhD, Senior Researcher
Naimahmed Nesaragi, MSc, PhD, Postdoc
Gabriela Salvadori Da Silva, DDS, Postdoc
Mohammad Zoofaghari, MSc, PhD, Senior Researcher
Ali Etemadi, MSc, PhD, Postdoc
Nikhil Pramod Kumar, MSc, PhD Fellow
Aminolah Hasanvand, MSc, PhD, Postdoc
Roufaida Laidi, MSc, PhD, Senior Researcher
Maryamalsadat Mahootiha, MSc PhD Fellow

Deliverables

- Research and publications
- Innovation in medical signal processing and communications technology
- Development of technological solutions, prototypes and demonstrators
- Intellectual property and management methods
- Multidisciplinary expertise in medical signal processing including machine learning and sensor communication technology
- Supervising students and fellows
- Teaching

Objectives

- Lead internationally in research and development of medical signal processing and communication technologies.
- Drive cutting-edge research in patient monitoring and innovative treatments, including minimally invasive and image-guided therapies.
- Promote academic engagement by encouraging staff to hold adjunct positions and support external research initiatives.
- Ensure strong collaboration between technologists and clinicians across projects.
- Provide technical expertise for transdisciplinary projects
- Development of bio-nano medical sensors (biological nanoelectronics)
- Creation of biologically-based communication and computing systems integrated with cloud services
- Design of advanced algorithms and machine learning for large-scale medical data analysis
- Fundamental research including theory, modeling, simulation, prototyping, and preclinical validation (“bench to bedside”)



Section for Medical Home Treatment

Head of section

Kathrine Olsen

Employee list

Amena Malic, Consultant
Ahilathasan Thamotharampillai, Senior engineer
Sobanthan Sivaraja, Engineer
Kjersti Charlen Andrada Santos, Nurse
Torgeir Garpestad, Engineer
Simen Alexander Haugen Elgaaen, Engineer
Admir Peskovic, Senior engineer
Jonas Rosenlund Jansen, Nurse
Kristoffer Røed, Chief engineer
Jon Røisi, Senior engineer
Monica Therese Sandblåst, Nurse
Henrik Seehusen Bentsrud, Consultant
Anne Sværen Reitan Orderud, Senior engineer
Geir Magne Veggeberg, Engineer
Tore Wenaas Nathanielsen, Consultant
Line Nordengen, Nurse

Deliverables

- Assistive devices in the OUH area on behalf of the South-Eastern Norway Regional Health Authority
- Collaboration with hospital departments when planning patient discharges
- Clarify roles regarding the responsibility for the distribution of assistive devices
- Handle referrals for assistive devices and contribute to improve logistics and coordination
- Manage the equipment inventory in compliance with regulations, with an emphasis on the sensible use of resources
- Contribute to the proper use and handling of treatment aids outside the hospital
- Ensure that users of treatment aids receive proper guidance in handling the equipment

Objectives

- Ensure that patients can borrow the equipment they need for treatment initiated in the specialist healthcare service
- Receive requests in DIPS (“Distributed Information and Patient Data System in Hospitals”), as well as scan requests received on paper into DIPS, in order to document the treatment aids in the patient record
- Handle requests for the loan of equipment, as well as quality-assured equipment selection
- Prepare equipment for delivery, as specified in the request
- Deliver equipment from the physical expedition located in Building 15D at Oslo University Hospital, Ullevål
- Ensure that patients receive the necessary medical consumables for further home treatment
- Manage equipment portfolio of treatment aids
- Consumables for patients, as well as logistics

Section for Patient Care

The section for patient care is an administrative section led by the Head of Department professor Mona -Elisabeth Rootwelt-Revheim. An increasing number of patients from a broad variety of divisions at Oslo University Hospital are treated at the Intervention Centre.

« One more year of success for research at The Intervention Centre »

Research groups presentation

Letter by the head of research

This year, The Intervention Centre (IVS) further strengthened its position as a strategic driver in technological healthcare research and implementation. Two new strategic research agreements on robot-assisted surgery (RAS) were signed with Medtronic and Cambridge Medical Robotics (CMR), illustrating how IVS facilitates collaboration with academia and industry, and supports the evaluation and implementation of RAS in Norway. In 2025, IVS was also selected as the national site for establishing magnetic resonance-guided high-intensity focused ultrasound (MRgFUS) for patients with treatment-resistant essential tremor who cannot, or do not wish to, undergo deep brain stimulation (DBS), providing a new treatment option and a new exciting platform for advanced translational research.

To strengthen our research environment, the R&D section of the Department of Medical Technology (MTA) was formally integrated into IVS in 2025, following a systematic review of activities at DTI. This reorganization is expected to enhance research quality and efficiency through closer collaboration, better project coordination and more targeted use of shared resources.

Clinical research at IVS continued to grow, with more ongoing studies and a marked increase in scientific publications compared with 2024, underlining the Centre's role as a facilitator of clinical research at the hospital. Research funding efforts were intensified, and at the end of 2025 IVS secured support from the Research Council of Norway for three ICT-related projects with a total budget of NOK 36 million.

In the national EVALMEDHELSE evaluation of life sciences research delivered in 2025, IVS was rated "internationally excellent" for research and publication quality. It was noted that a defining strength of IVS is the close integration of research, innovation and industry collaboration, embedded in everyday cooperation between clinicians and technologists. Looking ahead to 2026, this will be further strengthened. Cross-disciplinary projects and teamwork, with open dialogue and free exchange of ideas across professional and organizational boundaries, are essential to consolidating IVS's role as an attractive arena for R&D and public–private partnerships in the future.

Per Steinar Halvorsen
Head of Research
The Division of Technology and Innovation,
Oslo University Hospital

Image guided general surgery and intervention

Group leader

Bjørn Edwin, MD, PhD, Professor

Group members

Davit Aghayan, MD, PhD, Postdoc
Åsmund Avdem Fretland, MD, PhD
Sarkis Drejian, MD, PhD Fellow
Mehdi Sadat, MD, PhD Fellow
Mushegh Sahakyan, MD, PhD
Ingrid Schrøder Hansen, MD, PhD Fellow

Associated group members

Trond Buanes, MD, PhD, Professor emeritus
Ulrik Carling, MD, PhD
Vegar Dagenborg, MD, PhD
Ole Jakob Elle, MSc, PhD, Professor
Kjersti Flatmark, MD, PhD, Professor
Dejan Ignatovic, MD, PhD, Professor
Airazat Kazaryan, MD, PhD, Professor
Stig Ronny Kristiansen, MSc, IT-researcher
Knut Jørgen Labori, MD, PhD, Professor
Bård Røsok, MD, PhD
Sheraz Yaqub, MD, PhD, Associate professor
Anne Waage, MD, PhD
Gudrun Maria Waaler Bjørnelv, MSc, PhD
Egidijus Pelanis, MD, PhD
Mona-Elisabeth R.-Revheim, MD, PhD, Professor

Background

Minimally invasive surgery is evolving rapidly, and the need for systematic development and evaluation of these methods is necessary. Our group focuses on value based healthcare research of new minimally invasive surgical techniques and in addition the development of new procedures. The research is mainly conducted in the field of HPB-surgery (diseases in liver, bile ducts and pancreas) and adrenal gland surgery.

Ongoing projects

- The Oslo CoMet-study (Oslo randomized laparoscopic vs open liver resection for colorectal liver metastasis – study). Funding: South-Eastern Norway Regional Health Authority
- Oslo New CoMet: RCT comparing surgical treatment with local ablation for colorectal liver metastasis. Funding: South-Eastern Norway Regional Health Authority . In addition to the evaluation of surgical and oncological results, several translational studies are performed, such as bio banking of tumor tissue, studies on the inflammatory response, health economy evaluation and pain/QALY studies
- Multicentre studies on laparoscopic liver surgery and laparoscopic pancreatic surgery
- Project “Preoperative Data Models for Personalized Survival Treatment Analysis for Patients with Colorectal Liver Metastases” Funded by South-Eastern Norway Regional Health Authority , REK Helse Sør-Øst nr. 2011/1285
- Research on imaging of liver tumors (CT, MRI, PET-CT) conducted with other research groups at OUH
- In a joint project, a method for automatic segmentation of liver anatomy including tumors is developed. The final goal is to create an interactive map for liver surgeons that will greatly ease both planning and the actual surgery.
- Research on D3 resection of colon and small bowel cancer
- The research group is also working with findings from previous projects e.g. HiPerNav, (EU project), NorMit, MetAction and BigMed.

Collaborations

In all the projects, the group has a large international network of collaborators e.g. National Centre of Expertise for Ultrasound and Image-Guided Treatment, Trondheim, Tumor Biology, Radium Hospital, Oslo.

In addition, the group has a strong cooperation among the different research groups at The Intervention Centre.

Widespread cooperation with international researchers, selected collaborators:

- Professor Luca Aldrighetti Chief of Liver Unit, Department of Surgery, Scientific Institute San Raffaele, University Vita-Salute San Raffaele, Milan, Italy
- Professor Marc Besselink, Department of Surgery, Amsterdam UMC, Academic Medical Center, Meibergdreef 9, 1105 AZ Amsterdam, Netherlands
- Professor Alessandro Ferrero, Direttore f.f. S.C. Chirurgia Generaleed Oncologica Ospedale Mauriziano,Torino, Italy
- Professor Brian K. P. Goh, Head of Dept & Professor, HPB/Transplant Surgery, Singapore General Hospital
- Professor Mohammad Abu Hilal, Istituto Fondazione Poliambulanza, Bissolati No 57, 25124, Brescia, Italy
- Professor Robert Troisi, Policlinico Federico II di Napoli, Director Clinical Medicine and Surgery, Naples, Italy

MRI guided interventions and image research

Group leader

Einar Hopp MD, PhD,

Group members

Grethe Løvland, Radiographer

Steffen Maude Fagerland, MSc, PhD fellow

Kenneth Ottesen Pedersen, Radiographer

Tryggve Holck Storås, MSc, Professor

Mona-Elisabeth R.-Revheim, MD, PhD, Professor

Associated group members

Ilangko Balasingham, MSc., Professor

Per Kristian Eide, MD, PhD, Professor

Tor Endestad, Associate professor, UiO Ane Konglund, MD, PhD

Emil Espe, MSc, Associate professor

Henning Langmo Stokmo, MD PhD fellow

Einar Vik-Moe, MD, PhD, Professor

Ole Jakob Elle, MSc, PhD, Professor

Bjørn Edwin, MD, PhD, Professor

Background

MRI guided interventions are advanced methods for image guided treatments. Our focus is to improve and develop new methods for MRI guided interventions, as well as improve diagnostic MRI imaging in research settings. The research is mainly conducted in the field of neuroscience including fMRI and fMRI-neurofeedback imaging.

The MRI guided interventions span from intraoperative imaging in neurosurgical procedures to invasive catheter-based laser ablation of intracranial lesions, to non-invasive ablation procedures such as High Intensity Focused Ultrasound (HIFU)-therapy of soft tissue lesions in the uterine cavity or prostate gland.

Until now, the study group also has a focus on fibrosis in various forms (associated to cancer or degenerative processes) as visualized with different MRI and PET techniques and work closely with the participants in The Convergence Environment: Novel personalized management strategies for fibrosing diseases (FibroPET), FibroPET - UiO:Life Science. The group is also participants in TARACAN (Targeted RAdionuclide Therapy for CANcer); OUH - Institute for Cancer. Research, OUH - OUH-research.no.

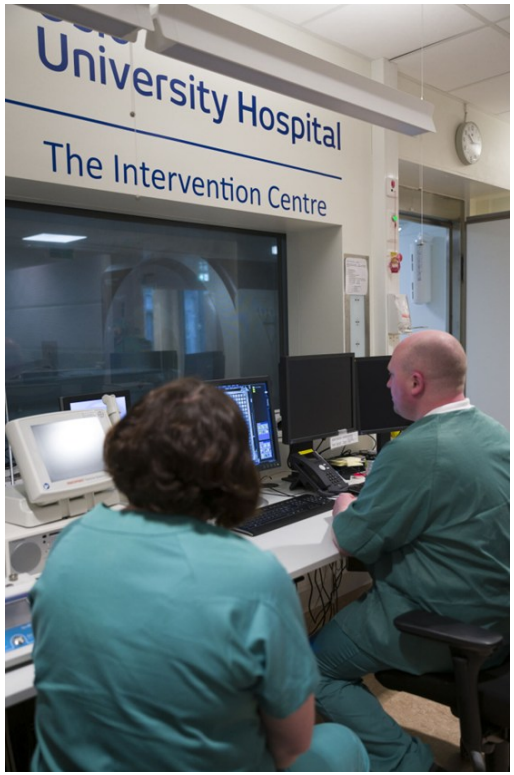
Late in 2025 “New methods”, the Norwegian national system of managed introduction of new methods in the specialist health care service, decided the introduction of transcranial MR-guided High Intensity Focused Ultrasound in Norway. One Exablate Prime system is due to be installed to The Intervention Centre during 2026. In the end of 2025, we therefore have focused on the planning of installation, education, and the creative process of new research strategies in our research group for the successful startup of this new and important activity at our Centre.

Ongoing projects

- Brain training using FMRI an fMRI neuro-feedback.
- Optimizing MRI sequences in intraoperative MRI.
- Visualize laser ablation of epileptogenic focus, intracerebral regions and lesions.
- Detecting novel sequences for Imaging of the decompensated heart, normal and pathological cardiac function and improved characterization of cardiac inflammation and focal or diffuse fibrosis.
- Imaging of fibrosis
- Theranostics

Collaborations

- Abass Alavi, Professor, Department of Radiology, Perelman School of Medicine, University of Pennsylvania
- Roberto Blanco, Professor, Turku University Hospital, Roberto Blanco – Turku HIFU Research Centre (utu.fi)
- Poul Flemming Høilund-Carlsen, Professor, Research Unit of Clinical Physiology and Nuclear Medicine, Department of Clinical Research, University of Southern Denmark
- Janek Frantzén, Turku University Hospital Neurosurgery MD, PhD, Adjunct Professor
- Vesa Kiviniemi, Oulu University Finland, Oulu Functional Neuroimaging - OFNI | University of Oulu



Clinical and experimental cardiovascular monitoring

Group leader

Per Steinar Halvorsen, MD, PhD, Professor

Group members

Andreas Espinoza, MD, PhD
Hilde Lang Orrem, MD, PhD
Janus Hyldebrandt, MD, PhD
Marte Sævik, MD

Associated group members

Ali Wajdan, MSc
Lars Prag Antonsen, MD
Karina Roheim Lappen, MD
Hilde Karlsen, MD
Guro Minken, MSc
Anne Marte Schrøder-Aasen, MD
Fredrik Jerve, MSc
Naimahmed Nesaragi, MSc, PhD
Maria Skytioti, MD, PhD
Svein Landsverk, MD, PhD
Harald Arne Bergan, MD, PhD

Background

The Clinical and Experimental Cardiovascular Monitoring research group aims to bridge the gap between cutting-edge technology and cardiovascular physiology by integrating novel concepts into clinical applications. Our focus involves the development and validation of innovative technologies for cardiovascular monitoring. We delve into exploring cardiovascular responses concerning novel therapies and minimally invasive surgical techniques.

Our interdisciplinary team comprises experts in anesthesiology, cardiology, and heart surgery. Additionally, we collaborate with technologists specializing in signal processing, data analysis, and sensor development.

Ongoing projects

- Better patient selection to Trans Aortic Valve Implantation (TAVI) for severe aortic stenosis: is preoperative myocardial flow reserve related to long term outcome?
- Automatic detection of aortic valve events using deep neural networks on cardiac signals from epicardially placed accelerometer.
- Enhanced monitoring of cardiac function in cardiac surgery using 3-axes accelerometers.
- The hemodynamic influence of venous pressure, mechanical ventilation, catecholamines and inflammation during laparoscopic liver resection and radiofrequency ablation of colorectal cancer liver metastasis.
- Improved detection of adverse events during Extracorporeal Membrane Oxygenation (ECMO)
- Improved monitoring in brain tumor surgery and awake craniotomy

Ongoing projects

- Cerebral blood flow monitoring in healthy subjects and surgical patients; association with postoperative cognitive impairment
- Patient-Reported Quality of Life in thoracoabdominal aortic aneurysms and juxtarenal abdominal aortic aneurysms
- EPIC-AI: Enhancing Prognostication and Improving reliability of EEG assessments in Coma after Cardiac Arrest with Artificial Intelligence

Collaborations

- Professor Ole Jakob Elle, Medical Robotics, visualization and navigation, the Intervention Centre, and Department of Informatics, University of Oslo (UiO)
- Professor Leiv Arne Rosseland, Division of Emergencies and Critical Care, Oslo University Hospital (OUH) and Institute of Clinical Medicine, UiO
- Professor Helge Skulstad, Department of Cardiology and Institute for Experimental Medical Research, OUH and Institute of Clinical Medicine, UiO
- Professor Ilangko Balasingham, Faculty of Information, Technology and Electrical Engineering, NTNU and Wireless Sensor Network Reserach group at The Intervention Centre.
- Professor Tom Eirik Mollnes, Department of Immunology, OUH, and Institute of Clinical Medicine, UiO.
- Professor Arnt Eltvedt Fiane, Department of Cardiothoracic Surgery, OUH, and Institute of Clinical Medicine, UiO.
- Professor Erik Waage Nielsen, Department of Immunology, OUH, and Institute of Clinical Medicine, UiO.
- Professor Einar Vik-Moe, Department of Neurosurgery, OUH, and Institute of Clinical Medicine, UiO
- Associate Professor Fred-Johan Pettersen, The Oslo Bioimpedance and Medical Technology Group, OUH, and Department of Physics, UiO.
- Senior Researcher, Espen Remme Medical Robotics, visualization and navigation, The Intervention Centre, and Institute for Surgical Research, OUH

The BioMedical Technology and Data Analytics group

Group leader

Ole Jakob Elle, MSc, PhD, Professor

Group members

Rahul P.K. Menon, MSc, PhD, Senior Researcher

Espen Remme, MSc, PhD, Senior Researcher

Varatharajan Nainamalai, MSc Postdoc

Vetle Christoffer Frostelid, MSc, PhD Fellow

Inger Grünbeck, MSc, PhD Fellow

Eirik G. Homlong, MSc, PhD Fellow

Yuliia Kamkova, MSc, PhD Fellow

Pravda Jith Ray Prasad, MSc, PhD Fellow

Håvard Solvin, MD, PhD Fellow

Ali Wajdan, MSc, PhD Fellow

Ignas Kupcikevicius, MSc PhD Fellow

Luca Boretto, MSc, PhD Fellow

Ole Elvebakk, MD, PhD

Fred-Johan Pettersen, MSc, PhD

Christian Tronstad, MSc, PhD

Håvard Kvaløy, MSc, PhD

Tormod Martinsen, MSc

Associated group members

Rafael Palomar MSc, PhD, Associate Professor, Senior Researcher

Egidijus Pelanis, MD, PhD

Dharani Maddali, MSc, PhD-fellow

Mohammad Reza, MSc, PhD-fellow

Abbas Tariverdi, MSc, PhD-fellow

Pål Sæther Knutson, MSc, PhD-fellow

Henrik Brun, MD, PhD, Professor

Bjørn Edwin, MD, PhD, Professor

Åsmund Fretland, MD, PhD,

Ola Wiig, MD, PhD

Per Steinar Halvorsen, MD, PhD, Professor

Ørjan Martinsen, MSc, PhD, Professor (Group leader BioImpedance group, Dept. of Physics - UiO)

Mona-Elisabeth R.-Revheim, MD, PhD, Professor

Background

Most minimally invasive procedures restrict the access and direct vision to the regions, which require surgery. Such procedures require intra-operative image modalities such as x-ray, ultrasound or endoscopic images to be able to monitor the procedure in real-time. Merging information acquired pre-operatively, mainly from for instance MRI, CT or PET, with intraoperative data can increase the basis for decisions and thereby improve the safety and accuracy of the procedure. The BioMedical Technology and Data Analytics group develops cutting edge technological solutions which support minimally invasive procedures. In particular, the group is focused on developing real-time image-segmentation and -registration methods including artificial intelligence (AI) based methods on segmentation and deformable registration. Visualization and navigation is required to present the medical images to the surgeon intraoperatively. Different visualization techniques such as Mixed Reality (MR) visualization are explored. 3D video will be more and more cross-linked with medical image information, as in Augmented Reality (AR) and move toward robotics and automation of surgical procedures. The research group is strengthened in biomedical sensor research and development, and do research within new and novel sensing and monitoring technology and multi-modal monitoring e.g.ECG, EEG, Accelerometer, gyro and bioimpedance sensors with advanced signal processing and analytics for detection of anomalies e.g. for heart monitoring and nerve signal monitoring for nerve stimulation and treatment. The research group use AI and is developing/applying Machine Learning algorithms for automation and decision support within patient monitoring and image processing/navigation.

Ongoing projects

- HoloSurge - Multimodal 3D Holographic tool and real-time Guidance System with point-of-care diagnostics for liver and pancreatic cancer surgical planning and interventions, start 01.01.2024 (EU funded)
- AMAZING-6G – Realtime AI-prediction of heart condition from ultrasound, start 01.01.2025 (EU funded)
- Participant in Eurostar EU: Precision medicine for improved and personalized Cardiac
- Resynchronization Therapy (CRT)
- Intelligent Image Guided Surgery (INIUS), (RCN, Eigil Samset)
- The AI Centre – TRUST (2025 – 2030): The Norwegian Centre for Trustworthy AI (RCN, Project owners: UiO, NR, SINTEF): Optimising Cardiac Care through AI-enabled Digital Heart Twins (Use-Case); AI-enabled hybrid Digital Twin for Continuous Monitoring, Detection and Prediction (Project)
- Finding the Invisible (Early detection of Cancer) with NTNU – Financed through NTNU in collaboration with OUH
- gAIt – AI based Gait analysis in cerebral palsy patients (PhD Project)
- Mixed Reality based navigation for orthopedics (PhD project, South-Eastern Norway Regional Health Authority)
- Colorectal liver metastases detection and segmentation (PhD Project)
- Smartsock (RCN, Kvanes legat)
- DIGTIPS (HSØ)
- WEBSPD (SPARK Norway)
- EBION (South-Eastern Norway Regional Health Authority)
- Electrosurgical Safety and Harm Prevention for Patients and Surgical Staff
- External trigeminal nerve stimulation versus sham stimulation for ADHD in children and adolescents (External funding, Denmark)

Collaborations

- Professor Azeddine Berghdadi, University Paris13
- Senior Engineer Ewout Brandsma, Philips
- Professor Stephane Cotin, INRIA
- Professor Jenny Dankelmann, Technical University of Delft (TUDelft)
- Professor Paolo Fiorini, University of Verona
- Senior Engineer Olivier Gerard, GE Healthcare
- Professor Juan Gomez-Luna, ETH Zurich
- Professor Pablo Lamata, King's College London/ University of Oxford
- Senior Researcher Thomas Langø, SINTEF – Digital
- Per-Hjalmar Lehne, Telenor AS
- Professor Frank Lindset, Norwegian University of Science and Technology (NTNU)
- Professor Andreas Melzer, University of Dundee
- Professor, Arianna Menciassi, Scuola Superiore Sant'Anna, Pisa, Italy
- Professor Joaquin Olivares, University of Cordoba
- Alois Regensburger, SIEMENS Healthineers
- Professor Eigil Samset, GE Healthcare
- CEO Alison Sundset, HoloCare AS
- Professor Jim Tørressen, University of Oslo (UiO)
- Professor Stefan Weber, University of Bern/ARTOrg)

Wireless sensor network research group

Group leader

Ilangko Balasingham, MSc, PhD, Professor

Group members

Florian Anderl, MSc, PhD Fellow
Jacob Bergsland, MD, PhD, Senior Researcher
Aminolah Hasanvand, MSc, PhD, Postdoc
Ali Khaleghi, MSc, PhD, Senior Researcher
Naimahmed Nesaragi, MSc, PhD, Postdoc
Gabriela Salvadori Da Silva, DDS, PhD, Postdoc
Mladen Veletic, MSc, PhD, Senior Researcher
Hemin Ali Qadir, MSc, PhD, Researcher
Mohammad Zoofaghari, MSc, PhD, Senior Researcher
Ali Etemadi, MSc, PhD, Postdoc
Roufaida Laidi, MSc, PhD, Senior Researcher
Nikhil Pramod Kumar, MSc, PhD Fellow
Milica Lekic, MSc, PhD Fellow

Associated group members

Bjørn Edwin, MD, PhD, Professor, Institute of Clinical Medicine, UiO
Per Steinar Halvorsen, MD, PhD, Professor, Institute of Clinical Medicine, UiO
Lars Aabakken, MD, PhD,, Professor, Institute of Clinical Medicine, UiO
Mark Zuchner, MD, PhD, Dept. of Neurosurgery, OUH
Åsmund Fretland, MD, PhD, Dept. of Gastro Surgery, OUH
Jean-Luc Boulland, MSc PhD, Associate Professor, Institue of Basic Medical Sciences, UiO
Mona-Elisabeth R.-Revheim, MD, PhD, Professor

Background

The group has expertise in communications technology and biomedical signal processing research and development. The group aims to contribute to the advancement of medical technologies, with a commitment to translating basic research into innovative concepts and further to practical solutions and preclinical testing and validation – “from bench to bedside”. The focus is in:

- Creation of Communication and Computational Systems (Molecular Communications Technologies team): Engage in the development of intra- and on-body communication and computational systems centreed around biological entities at the multi-scale, including molecules, cells, and organs. This extends to mathematical modeling, computer-assisted simulations, and prototype development. The prototypes are designed to establish seamless connectivity with the Internet, facilitating the storage and processing of substantial volumes of data.
- Innovation in Data Processing Algorithms (Artificial Intelligence team): Innovate and create novel algorithms tailored for the processing and comprehension of extensive biomedical datasets. This encompasses information from various sources such as genetic materials, (bio)sensors, medical records and images, and test results. The goal is to enhance precision in diagnostics, treatment methodologies, and subsequent patient follow-up.
- Development of Advanced Medical (Bio)Sensors and Communications (Radio-Frequency Communications team): Pursue the advancement of medical (bio)sensors utilizing cutting-edge bionanotechnologies. This means pioneering in-body wireless communication strategies for sensor data, as well as power transfer mechanisms to energize sensors and remotely stimulate cells. The focus encompasses innovative approaches such as radiative, conductive, and inductive methods, leveraging a diverse array of nanoparticles, metamaterials, and electric and magnetic materials.

Ongoing projects

- Enhancing Prognostication and Mitigating Uncertainty Improving Reliability of EEG Assessments in Post -Cardiac Arrest Coma , (Funded by South-Eastern Norway Regional Health Authority)
- AMAZING-6G – Amazing Large-Scale Trials and Pilots for Verticals in 6G (Funded by the European Commission Horizon Europe 6G-SNS)
- Preoperative Data Models for Personalized Survival and Treatment Analysis for Patients with Colorectal Liver Metastases, Funded by Health South East Trust)
- Wireless Brain-Connect Interface to Machines (FET) (Open Program)
- Internet of Bio-NanoThings for Prediction and Prevention of Infectious Diseases (CLIPEUS), (Funded by the Research Council of Norway, IKTpluss program)
- Reliable Technologies and Models for Verified Wireless Body-Centric Transmission and Localization (ROVER), (Funded by the European Commission H2020-MSCA-RISE)
- 5G HEalth AquaculturE and Transport validation trials (5G-HEART), (Funded by the European Commission H2020:ICT)
- Communication Theoretical Foundation of Wireless Cardiac Nanonetworks (CIRCLE). (Funded by the Research Council of Norway)
- Next-Generation Theranostics of Brain Pathologies With Autonomous Externally Controllable Nanonetworks: A Transdisciplinary Approach With Bio-Nanodevices Interfaces (GLADIATOR), (Funded by the European Commission H2020:Future Emerging Technologies (FET) Open Program)
- Wireless In-body Sensor and Actuator Networks (WINNOW). (Funded by the Research Council of Norway, IKTPLUSS)

Collaborations

- Professor Phillip C. Yang, Stanford University, USA
- Professor Benjamin H. Kann, Harvard University, USA
- Professor Jari Iinatti, Oulu University, Finland
- Professor Christopher Contag, Michigan State University/Stanford University, USA
- Professor Ram Narayanan, Penn State University, USA
- Professor Dirk Pletemeier,Technical University of Dresden, Germany
- Professor Seppo Vainio, Oulu University, Finland
- Professor Jianqing Wang, Nagoya Institute of Technology, Japan
- Professor Robin Augustine, Uppsala University, Sweden
- Dr. Paul Wada, Blackrock Neurotech, USA
- Dr. Sebastian Scholtek, Ovesco AG, Germany
- Dr. Johannes Solhusvik, Sony Europe B.V., Norway
- Dr. Delphine Fuerstein, LivaNova, France Dr. Patrick Waldemar, Telenor, Norway

Clinical testing work group

Group leader

Egidijus Pelanis, MD, PhD, Special medical advisor responsible for Method Development and Industry Collaboration, Senior researcher

Background

The group focuses on private-public partnerships and testbed activities related to preclinical and clinical evaluation of medical devices. Additionally, this group facilitates communication between industry and the rest of Oslo University Hospital related to testbed inquiries and work related to establishment and maintenance of private-public partnerships.

Ongoing projects

- Validation of Cardiaccs Monitoring System for heart function assessment in a closed thorax
- Pre-Clinical Assessment of 8VT-D Probe

Networks

- Norway Health Tech
- Nordic Proof
- Nortrials MU

Activities

The research group continued participation in the Nordic Proof Network and took part in several web-based and in-person meetings including MEDICA 2025 with the focus on expanding the network and gathering experience from testbed and as well as public private partnerships activities around Europe. Additionally, the research group joined Nortrials MU national initiative to facilitate dissemination of testbed inquiries and activities in Norway.

During the reporting period, the following companies were involved in projects carried out through the group:

- Cardiaccs
- Edwards Lifesciences
- GE Healthcare
- Holocare
- Medtronic
- Siemens Healthineers
- CMR Surgical
- Sopra Steria

Organization, education and technology development in the health care services

Group leader

Kjersti Wendt, RNA, MSc, PhD, Associate professor

Group members

Erik Fosse, MD, PhD, Professor emeritus
Heidi Holmen, RCN, MSc, PhD, Associate professor
Karl Arne Johannessen MD, PhD, Professor emeritus
Bjørn Erik Mørk, Cand polit., PhD, Professor
Kathrine Olsen, Section leader, Section for Medical Home Treatment

Associated group members

Anne Strand Finstad, RNA, MSc, PhD, Professional development nurse
Milada Cvancarova Hagen, MSc, PhD, Professor

Research aims

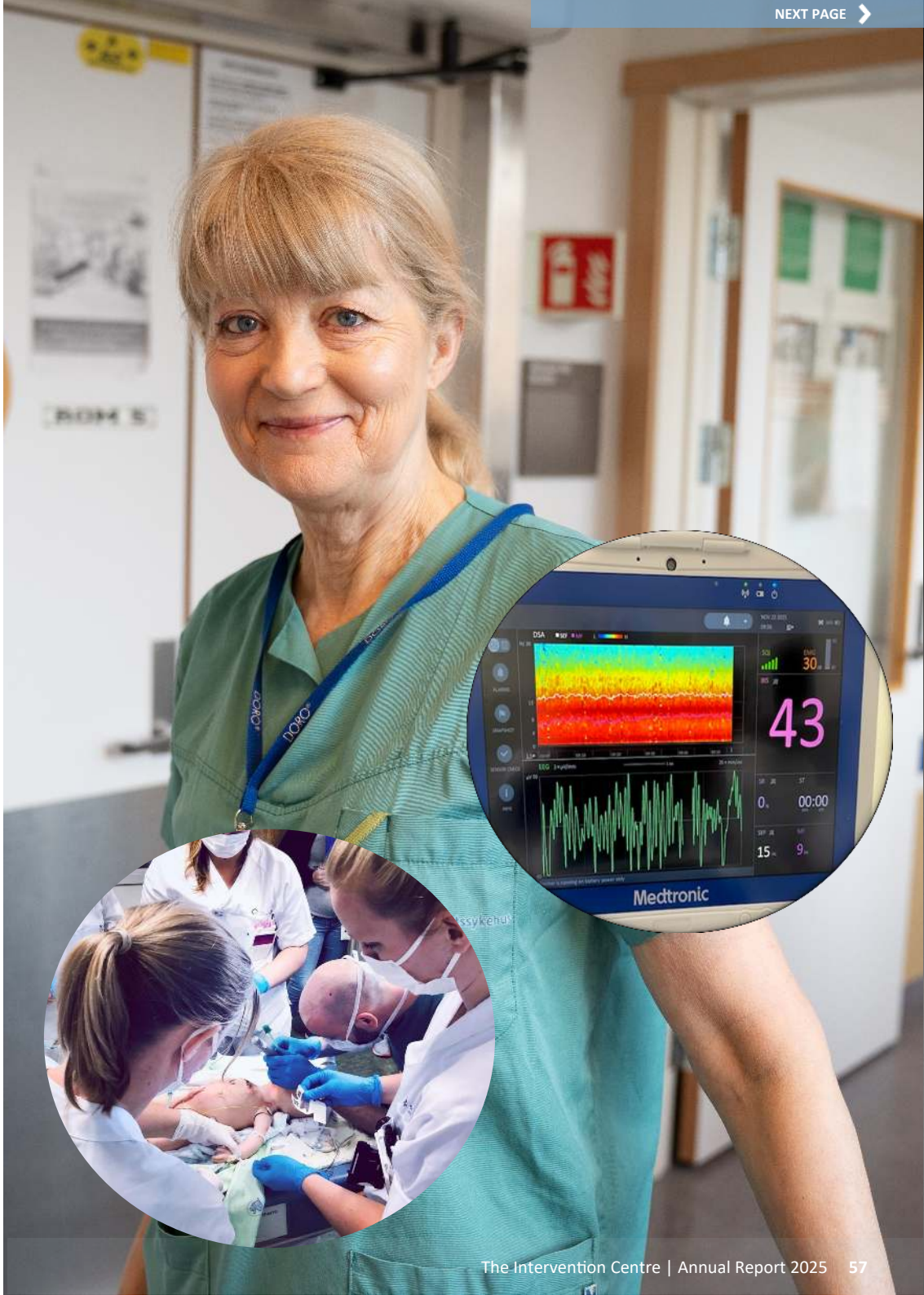
To investigate how technological developments may affect and contribute to enhance health care performances and deliveries in areas related to organizational and educational issues in the health care services

Ongoing projects

- Testing and development of new communication technology and strategy for operating room nurses
- Perioperative airway management
- Educational interventions related to intraoperative EEG interpretation

Collaborations

- OsloMet
- SimOslo
- Statistics Norway



The medical software research lab (MESH|Lab)

Group leader

Rafael Palomar, MSc, PhD, Associate professor

Group members

Ruoyan Meng, MSc, PhD Student

Associated group members

Bjørn Edwin, MD, PhD, Professor
Åsmund Fretland, MD, PhD
Egidijus Pelanis, MD, PhD
Ingrid Schrøder Hansen, MD, PhD Fellow
Sarkis Drejian MD, PhD Fellow
Gabriella d'Albenzio, MSc, PhD
Davit Aghayan, MD, PhD
Mona-Elisabeth R.-Revheim, MD, PhD, Professor

Students

Khai Duong, Student
Omar El Hajj, Student
Jonas Ludwig, Visiting student
Eléonore Germond, Visiting student

Background

The Medical Software Research Lab (MESH|Lab), hosted at The Intervention Centre, is dedicated to pioneering advancements in medical software, with a primary focus on improving clinical outcomes through research and practical applications. Our mission is to accelerate medical innovation through software that makes precision care possible - translating real-world clinical challenges into cutting-edge solutions that directly benefit patients and healthcare professionals. The group is strongly committed to the principles of open-source software, believing that sharing code openly accelerates innovation, fosters collaboration, and ensures its research can be widely utilized and built upon by the global medical and scientific community.

Ongoing projects

- Slicer-Liver (https://github.com/ALive-Research/Slicer-Liver)
- Slicer-SOFA (https://github.com/Slicer/Slicer-SOFA)
- SystoleOS (https://github.com/SystoleOS)

Collaborations

The MESH|Lab group actively contributes to the 3D Slicer project (https://slicer.org) and the organization of the bi-annual NA-MIC Project Week, in collaboration with Brigham and Women's Hospital (Harvard University) (USA), École de Technologie Supérieure (Montreal, Canada) and Kitware, Inc. (USA).

In addition, the group has a large network of national and international collaborators:

- Dr. Steve Pieper Harvard, Isomics, Inc. USA
- Prof. Simon Drouin ÉTS Canada
- Dr. Paul Baksic INRIA France
- Prof. Maria Francesca Spadea KIT Germany
- Dr. Tina Kapur Harvard, BWH USA
- Prof. Gabor Fichtinger Queen's University Canada
- Prof. Javier Pascau UC3M Spain
- Dr. Andras Lasso Queen's University Canada
- Dr. Sam Horvath Kitware Inc. USA
- Dr. Hugo Talbot INRIA France

Theses and publications

PhD theses

1. Boretto L. Multi-modal laparoscopic liver navigation [doctoral thesis]. Oslo: University of Oslo; 2025. Available from: https://nva.sikt.no/registration/019a3459eb7a-cf8c667a-c459-4107-b805-1ca511849f68

⇒ Short summary: Laparoscopic liver surgery is less invasive but challenging because the liver deforms during the procedure, making it difficult to relate preoperative images to the surgical view. This project develops a navigation system that reconstructs a real-time 3D model of the liver using laparoscopic video, ultrasound, tracking, and AI techniques. The system provides accurate, patient-specific visualization during surgery, improving anatomical understanding and potentially reducing complications.

2. Lippert M. Towards anatomic digital twins in structural heart disease [doctoral thesis]. Oslo: University of Oslo; 2025. Available from: https://nva.sikt.no/registration/019c9177cc56-50b22302-9b5c-4a6d-a1ef-b978fd25a4eb

⇒ Short summary: Structural heart disease affects up to 1% of newborns and often requires repeated interventions, making accurate 3D visualization essential for diagnosis and treatment planning. This thesis explores the use of AI-generated “digital twin” heart models and mixed reality to improve visualization and clinical decision-making. The results show that these models enhance diagnostic accuracy, influence treatment decisions, and have strong potential for integration into clinical practice.

3. Mahootiha M. Development of a multimodal artificial intelligence framework for cancer prognosis [doctoral thesis]. Oslo: University of Oslo; 2025. Available from: https://nva.sikt.no/registration/019c9168b3c8-1756c7f4-30e5-4430-8695-0f5f34c56432

⇒ Short summary: Cancer prognosis is traditionally a manual and variable process, but this thesis explores how artificial intelligence can improve predictions of survival and disease progression. By identifying patterns in medical images, AI models were developed to predict outcomes in kidney and brain cancers, with higher accuracy when combined with clinical data. These results show that integrating imaging and patient information can enable more consistent and efficient decision-making in cancer care.

4. Meng R. Analytics and visualization for computational liver surgery planning [doctoral thesis]. Trondheim: Norwegian University of Science and Technology (NTNU); 2025. Available from: https://nva.sikt.no/registration/019a39b882ff-29040094-ccb0-481e-a3bb-7368ba8161d4

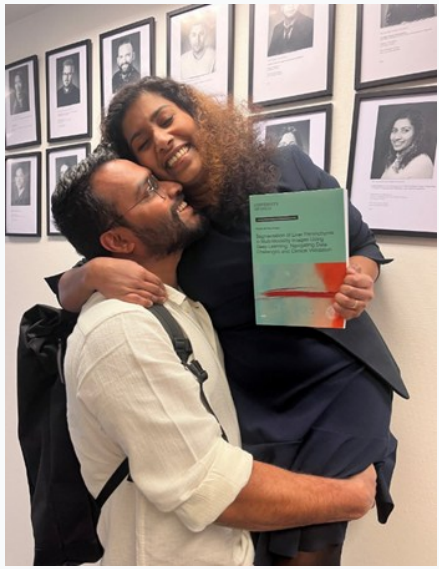
⇒ Short summary: This thesis addresses the challenges of liver surgery planning by developing new tools to improve visualization and analysis of the liver’s complex anatomy. It introduces methods such as Resectogram, enhanced vascular-based segmentation, and flexible volumetric analysis to support more precise surgical planning. Together, these advances enable safer, more informed, and patient-specific surgical decision-making.

Theses and publications

PhD theses

5. Prasad PJR. Segmentation of liver parenchyma in multi-modality images using deep learning: navigating data challenges and clinical validation [doctoral thesis]. Oslo: University of Oslo; 2025. Available from: https://nva.sikt.no/registration/019c912d4812-a97cd743-5859-4720-8a4b-63acce05ffbf

⇒ Short summary: Liver cancer is a common and deadly disease, and successful laparoscopic treatment requires precise planning due to limited visibility and tactile feedback. Extracting relevant information from medical images to create patient-specific models can improve outcomes, but the process is labor-intensive. This thesis explores how deep learning can enable automated 3D model generation, addressing challenges such as limited data, validation, and trust, and demonstrating its potential for clinical use.



6. Wajdan A. Automatic monitoring of cardiac function using epicardial accelerometers: detection of left ventricular valve events with signal processing and deep learning [doctoral thesis]. Oslo: University of Oslo; 2025. Available from: https://nva.sikt.no/registration/019aa59dbec6-1080d747-1c96-4c76-bfe8-b092b43cf919

⇒ Short summary: Continuous monitoring of cardiac function during surgery is essential, but current tools lack real-time mechanical insight. This thesis develops automated methods using epicardial accelerometers and AI to detect heart valve events and derive detailed functional measures. The results demonstrate accurate, continuous assessment of cardiac performance, highlighting strong potential for clinical use.

Master theses

1. Espinoza U. Multi-modal integration of RNA-seq and MRI to evaluate exosome-based regenerative therapies for myocardial infarction [master's thesis]. Trondheim: Norwegian University of Science and Technology (NTNU); 2025. Available from: https://nva.sikt.no/registration/019e82327971-e6388ab4-9d8b-4b00-93df-e4dad1c4af73
2. Fossen J. Digitalisation as a governable project? An analysis of the Office of the Auditor General's performance audits 2007–2025 [master's thesis]. Oslo: University of Oslo; 2025. Available from: https://nva.sikt.no/registration/019c50a6a021-6c073adb-ad5f-42c3-a7b0-736597dab3f0
3. Fraser-Green J. Analysing MRI of the shoulder in Norway: a mapping of low-value examinations and regional trends [master's thesis]. Oslo: University of Oslo; 2025. Available from: https://nva.sikt.no/registration/019c8fd94282-e3c5c358-3709-49b2-9513-2ced4e89026e
4. Gondal Z. Design and analysis of a novel spiking neural network hardware accelerator [master's thesis]. Trondheim: Norwegian University of Science and Technology (NTNU); 2025. Restricted access. Available from: https://nva.sikt.no/registration/019b266e0ad1-e090faba-c7d8-44c7-b893-8a90b5f8b298
5. Mailand PA, Eilertsen EW. Artificial intelligence and automated infusion in anesthesia: a scoping review [master's thesis]. Oslo: Oslo Metropolitan University; 2025. Restricted access. Available from: https://nva.sikt.no/registration/019bda344034-654165d2-cdb1-4aad-9c04-42c2dfd9c2d8
6. Middelthon LC. Synthetic biocommunication dynamics through time-harmonic electromagnetic fields [master's thesis]. Trondheim: Norwegian University of Science and Technology (NTNU); 2025. Available from: https://nva.sikt.no/registration/0198eba23826-bcc27d5a-7aa1-42fa-933c-289295a72d09
7. Pedersen KO. Predicting functional outcome at 90 days in acute stroke from perfusion MRI [master's thesis]. Trondheim: Norwegian University of Science and Technology; 2025. Available from: https://nva.sikt.no/registration/019d0f322292-913f3411-ebfb-47e2-bf51-de8faca0f521
8. Rashid AA. Towards semi-autonomous robotic transoesophageal echocardiography: model-free control of continuum robotic TOE probe using deep reinforcement learning [master's thesis]. Oslo: University of Oslo; 2025. Available from: https://nva.sikt.no/registration/019c913e6fef-5e75cd58-d048-4c7d-a037-90ff606db9f9
9. Sebergsen C. Deep learning for real-time echocardiographic segmentation and cardiac health assessment: UNet-based architecture for live ejection fraction and longitudinal linear strain monitoring [master's thesis]. Oslo: University of Oslo; 2025. Available from: https://nva.sikt.no/registration/019c91473987-f80d7ccb-7037-4a03-99ea-5a0fa7eccfdb
10. Sollied KS, Skaget RU, Otnes T. Use of dynamic measurement tools in pediatric patients: a systematic literature review with a narrative synthesis of observational studies [master's thesis]. Oslo: Oslo Metropolitan University; 2025. Available from: https://nva.sikt.no/registration/019c03671d93-6f7727a8-0137-4318-b441-ed13bc81ea5b
11. Staldvik YS, Steinsland I. To what extent does the modified Mallampati test correlate with the intubation difficulty scale? [master's thesis]. Oslo: Oslo Metropolitan University; 2025. Restricted access. Available from: https://nva.sikt.no/registration/019bdf5aa8d2-951923dc-1c16-460e-b891-9295542b98a5

List of publications

1. Abbassi F, Pfister M, Braun J, Angenete E, Haglind E, Onerup A, et al. Beyond P Values : Novel Minimal Important Difference of the Comprehensive Complication Index That Reflects a Meaningful Outcome for Patients Undergoing Major Abdominal Surgery. Ann Surg. 2025;282(5):670–7.

2. Abu Hilal M, Hoogteijling TJ, Edwin B, Dagher I, D'Hondt M, Marques HP, et al. The Brescia internationally validated European guidelines on minimally invasive liver surgery. Br J Surg. 2025;112(6).

3. Ahmed M, Gandhi OH, Singh SB, Gujral J, Park PK, Shrestha BB, et al. Application of [18F]-fluorodeoxyglucose PET/computed tomography to measure volume and metabolic activity of arm muscles. Nuclear Medicine Communications. 2025.

4. Anderl F VM, Balasingham I. Bayesian Filtering of Biochemical Analyte Dynamics With Bacterial Sensors. IEEE. 2025:2273 – 86.

5. Antonsen LP, Landsverk SA, Halvorsen PS, Thiara A, Lilja D, Nesaragi N, et al. Accelerometer-based vibration analysis and oxygenator thrombosis in venovenous ECMO: an experimental porcine model. Intensive Care Med Exp. 2025;13 (1):55.

6. Balasingham AHI. Harmonic Backscattering and Wireless Power Transfer for Deep In-Body Implantable Wireless Sensors: A Novel Approach. IEEE. 2025.

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