Neuro-SysMed

ANNUAL REPORT 2025

Centre for
Clinical Treatment
Research

CONTENT

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DIRECTORS' COMMENTS

2025 has been a milestone year for Neuro-SysMed, marked by the completion of major clinical trials, strengthened international partnerships, and securing large-scale funding, catalytic to our long-term sustainability.

A major milestone this year has been the completion of six clinical trials across our disease areas: SMART-MS, TAF-1, N-DOSE, N-DOSE AD, NOPARK, and OVERLORD. Together, these studies have made a substantial contribution to evidence generation in multiple sclerosis, Parkinson's disease, Alzheimer's disease, and related neurodegenerative conditions. Completing this portfolio of trials within the Centre's funding period demonstrates Neuro-SysMed's strong operational capacity, effective recruitment networks, and close collaboration between clinicians, researchers, and patients. The results from these trials form a critical foundation for future therapeutic strategies, follow-up studies, and innovation activities.

Internationalisation has continued to be a defining feature of Neuro-SysMed in 2025. We secured new international funding from Cure Parkinson's and SPARK-NS, further validating the scientific quality and translational relevance of our research. These grants also strengthen our position within the global neurodegeneration research landscape. Our annual Neuro-SysMed Symposium reflected this development clearly, with a growing number of international collaborators present, contributing scientific perspectives, and laying the groundwork for new joint initiatives and consortia.

Neuro-SysMed has also maintained a visible and active role in national science policy and public discourse. In 2025, the Centre again contributed to debates and events at Arendalsuka, addressing topics such as clinical trials, innovation in neurological diseases, and long-term strategies for brain health. These contributions underline our commitment not only to excellent research but also to societal impact and informed policy development.

An important achievement this year has been the successful securing of new funding for spin-off projects and centres that ensure the continuation of key activities originally spearheaded by Neuro-SysMed. This includes strong support for the Mohn Center for Neuroprotection, the SFI Innovation Center for Neuroresilience (ICoN), projects funded by the Olav Thon Foundation, KLINBEFORSK, and multiple initiatives supported by the DAM Foundation and patient organizations. Together, these efforts safeguard competence, infrastructure, and collaborative networks built within Neuro-SysMed, and enable them to develop further beyond the Centre's formal funding period.

As Neuro-SysMed moves toward the later phase of its Centre lifecycle, 2025 stands out as a year where long-term impact has clearly come into focus. With completed trials, sustained international funding, strong innovation pathways, and enduring partnerships with patients, funders, and policymakers, the Centre is well-positioned to leave a lasting legacy in neurodegenerative disease research and care.

Yamila Torres Cleuren, Managing Director

Charalampos Tzoulis, Director

Kjell-Morten Myhr, Co-Director

VISION AND GOALS

Neuro-SysMed is a Norwegian Centre of Excellence for Clinical Treatment Research, focusing on four neurological diseases: multiple sclerosis (MS), Parkinson's disease (PD), amyotrophic lateral sclerosis (ALS), and dementia disorders, including Alzheimer's disease and dementia with Lewy bodies.

The overarching aim of Neuro-SysMed is to develop new therapies and improved treatment strategies. The Centre facilitates early access to these new therapies for patients across Norway through participation in national and international randomised clinical trials. Our ultimate goal is to reduce the burden of disease.

The Centre has established a comprehensive, novel support framework to address the unmet treatment needs of Norwegian patients with these four diseases. By doing so, we enable patients from all over Norway to access cutting-edge treatment trials, and we develop precision medicine.

Specifically, Neuro-SysMed continues to work towards:

- discovering novel therapeutic compounds through both *in silico* and *in vitro* screening and assessing them in novel disease models
- conducting clinical trials and bringing cutting-edge research to patients
- developing biomarkers for disease detection, patient stratification, treatment response, and precision medicine
- enhancing patient care by improving daily function and quality of life
- introducing systems medicine into Norwegian neurology

RESEARCH PLAN AND STRATEGY

Neuro-SysMed's clinical trials remain central to the Centre's mission in 2025, serving as the backbone for its translational and systems medicine activities. Biological samples and multimodal data generated through our trials continue to fuel cross-disciplinary research across clinical, molecular, computational, and epidemiological domains. The integration of expertise across neurology, genetics, bioinformatics, imaging, and experimental medicine has further strengthened our ability to translate discoveries into clinical impact.

Neuro-SysMed organises and conducts randomised clinical trials to evaluate the efficacy and safety of both novel compounds and established drugs used for new indications. These studies aim to delay or halt disease progression, reduce symptom burden, and optimise care for individuals affected by neurodegenerative disorders. While each trial addresses distinct scientific questions and endpoints, all contribute harmonised, high-quality data, including clinical scores, genomic and transcriptomic profiles, blood and cerebrospinal fluid biomarkers, tissue-based molecular analyses, and advanced neuroimaging. Collectively, these data enable the identification of biomarkers for early and precise diagnosis, improved patient stratification, prediction of treatment response, and more accurate prognostic assessment, ultimately supporting personalised and mechanism-based treatment strategies.

In 2025, the Centre reached a major milestone with the completion of six randomised clinical trials: SMART-MS, OVERLORD-MS, TAF-MS 1, NO-PARK, N-DOSE AD, and N-DOSE PD. The results from these studies will be disseminated throughout 2026 and are expected to provide important new insights that may shape future therapeutic strategies within their respective fields.

Within systems medicine, the Parkinson's disease (PD) Node continues to lead internationally. The ParkOme project has mapped molecular profiles from tissue samples of more than 1,300 post-mortem brains from individuals with PD and related neurodegenerative diseases, establishing the largest brain omics database in PD worldwide. This unique resource underpins ongoing efforts to identify clinically actionable biomarkers across all four disease areas in the Centre.

In parallel, several advanced cellular models have been developed and implemented for mechanistic studies and therapeutic screening. Significant progress has also been made in in silico drug discovery, leveraging large-scale omics data in combination with national Norwegian health registries to prioritise and validate promising treatment candidates. Together, these advances reinforce Neuro-SysMed's integrated clinical–molecular–computational framework and accelerate the path toward improved patient care.

ORGANISATION OF THE CENTRE

The Centre is hosted by Haukeland University Hospital (HUH) in partnership with the University of Bergen (UiB) and Haraldsplass Deaconess Hospital (HDH) in Bergen, Norway. Neuro-SysMed is funded by the Research Council of Norway (RCN) and the host and partner institutions.

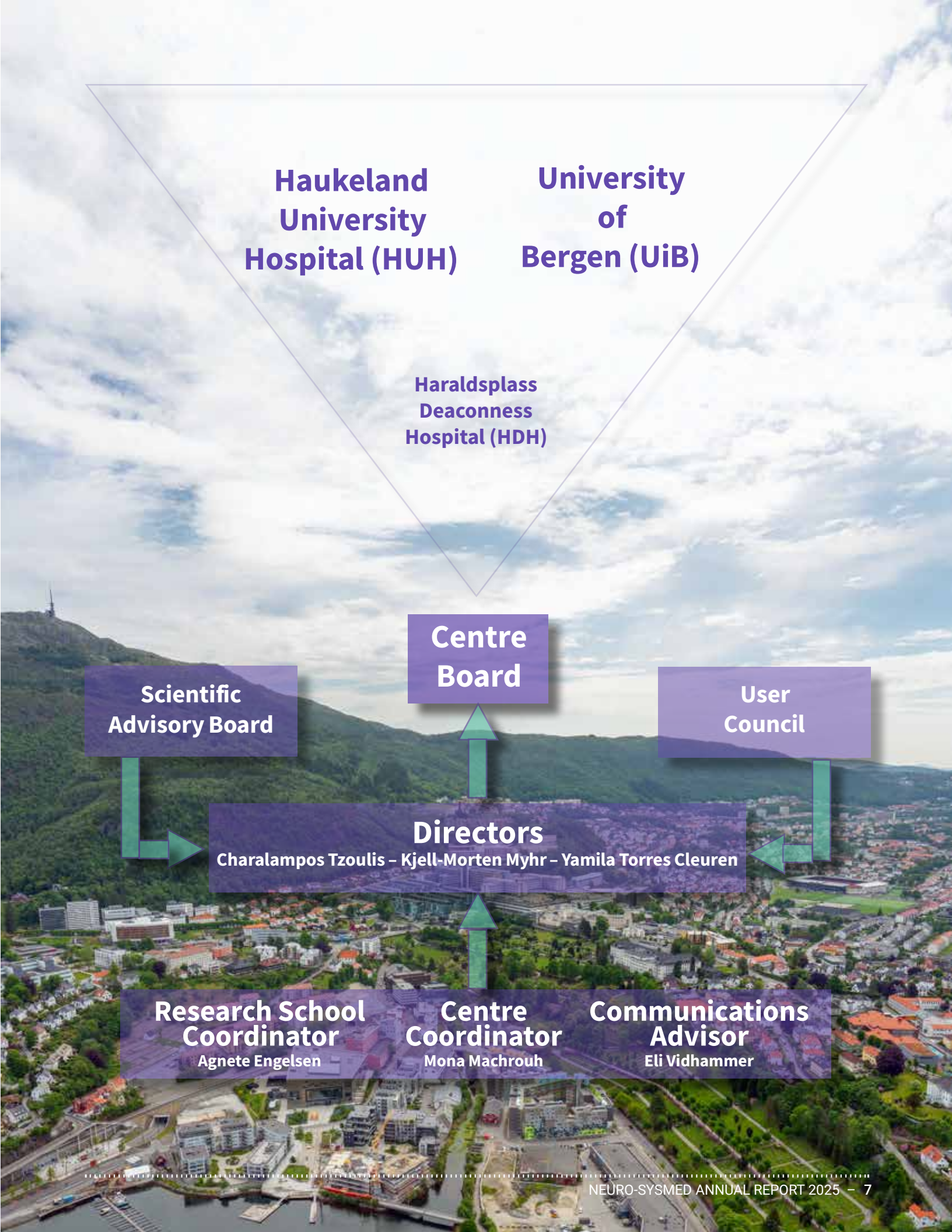
Organisational structure

The Centre is led by Professor Charalampos Tzoulis (Centre Director and Head of the Neurodegeneration Program), Professor Kjell-Morten Myhr (Centre Vice-Director and Head of the Multiple Sclerosis Program), and Dr. Yamila Torres Cleuren (Centre Managing Director and Head of Research and Innovation Strategy). At the implementation level, the Directors, supported by the Neuro-SysMed administrative team, manage the Centre's personnel, financial plans, communication, and dissemination activities and coordinate annual and financial reporting to the Norwegian Research Council. This is further supported by the host and partners' own administrative departments.

The **Centre Board** includes members from the host and partner institutions. The board is chaired by Professor Marit Bakke (replacing Professor Per Bakke mid-2025), Dean of the Medical Faculty (MED), UiB. The other board members are Eivind Hansen, Chief Executive Officer (CEO) of HUH, Torhild Næss Vedeler, Director of the Neurology Clinic, HUH, Silje Skrede (replacing Helge Ræder mid-2025), Vice Dean for Research and Innovation, MED, UiB, Kjerstin Fyllingen, CEO of HDH, Reidun Tjønn Rinde, Chair of the User Committee at HUH, and Lise Johnsen, Norwegian MS Society and Chair of the Neuro-SysMed User Council. The Centre Board members meet biannually and facilitate cooperation between the consortia, advise on overarching Centre strategies, and aid the Centre leadership with administrative challenges. The Board ensures that the Centre follows the planned work as specified in the agreement with the Norwegian Research Council and that this happens within the agreed budget and schedule. The Centre is also supported by a **Scientific Advisory Board**, providing scientific guidance and feedback, and a **User Council.**

Cooperation between partners

Most of the work is physically located at the Haukeland Campus (HUH, UiB, HDH). The Neuro-SysMed researchers work across departments and institutions using their resources and facilities. The Neuro-SysMed laboratory, administration, most offices, and most of the clinical work are located at the Neurology Clinic, HUH. In addition, resources such as imaging, bio-banking, stem cell facilities, core facilities at the Medical Faculty, including animal facilities, and biostatisticians, among others, are available for Neuro-SysMed at all three institutions in Bergen. This close co-localisation allows for close interactions between the research groups to work towards shared projects and goals. Each research group has weekly meetings and often invites members from other groups to take part in scientific discussions, often pertaining to the different research nodes. In 2025, we have continued organising our monthly seminar series and a larger symposium organised in the autumn term with all Neuro-SysMed members and invited international speakers. These activities provide crucial meeting points for scientific discussions and cooperation for all Centre members, students, and interested collaborators.


Haukeland University Hospital (HUH)
University of Bergen (UiB)
Haraldsplass Deaconness Hospital (HDH)
Centre Board
Scientific Advisory Board
User Council
Directors
Charalampos Tzoulis – Kjell-Morten Myhr – Yamila Torres Cleuren
Research School Coordinator
Agnete Engelsen
Centre Coordinator
Mona Machrouh
Communications Advisor
Eli Vidhammer

CORE CENTRE PERSONNEL AND FACILITIES

Neuro-SysMed provides the foundation for supporting its ongoing clinical and translational projects and for the development and establishment of new projects. This includes dedicated personnel and infrastructure.

The Neuro-SysMed laboratory

The Neuro-SysMed laboratory provides the critical infrastructure required to support the clinical and translational research taking place at the Centre. The offices and the laboratory benches of the Neuro-SysMed laboratory currently host more than 40 people, including laboratory engineers and researchers at all levels, from master-level students to senior scientists. The Neuro-SysMed laboratory comprises a state-of-the-art wet-lab and computational facilities. We have a dedicated Lab Manager, Hanne-Linda Nakkestad, in charge of the day-to-day management of the facilities, in addition to technicians assisting with sample processing from the clinical trials as well as with translational research.

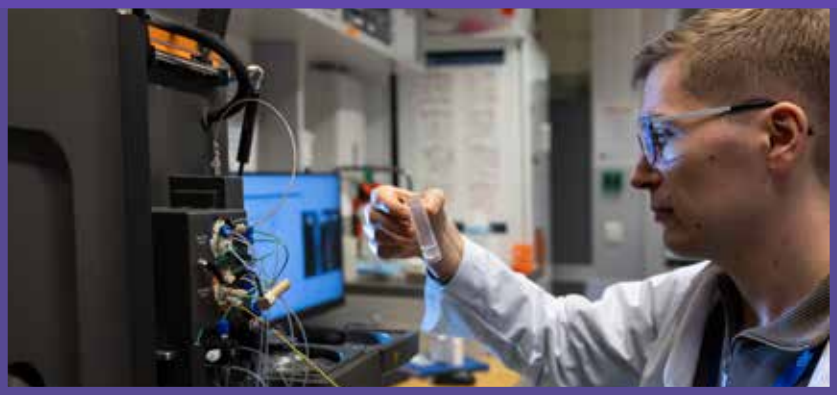
The ***wet-lab facilities*** include the following functional units:

- General-purpose molecular biology laboratory.
- Tissue processing and morphology/microscopy laboratory.
- Cell-culture facilities.
- Biomarker facility, including a Simoa Quanterix digital biomarker detection platform.
- Genomics facility, including a dedicated 10X Chromium platform for high-throughput parallel single-cell analyses and a spatial transcriptomics platform purchased in 2025.
- Seed-amplification assay (SAA) equipment.
- Ultra-freezer facility hosting a human brain and tissue bank.
- Nanoparticle tracking analyses (NTA) for Extra-cellular Vesicles (EVs) characterisation (NanoSight).

The ***computational unit*** comprises expert bioinformaticians who perform a complete range of big data analyses – from raw-data pre-processing to sophisticated supervised and unsupervised analytical approaches. This is being led by Gonzalo Sanchez Nido and Dimitrios Kleftogiannis.

Clinical Trials Unit

At the heart of Neuro-SysMed are the clinical trials. In 2025, the Centre had 37 investigator-initiated clinical trials in addition to several industry-sponsored trials. To administer this substantial number of trials, we have a



full-time clinical coordinator, Ingunn Anundskås, as part of our core team, along with our eleven research nurses and part-time coordinators from HUH's Research and Development (R&D) Department. Practical planning of the clinical trials (including protocols, ethics approvals, site recruitment, monitoring, etc.), patient recruitment and execution, and data monitoring and analysis are coordinated by our clinical trials unit together with the PI of each study.

We have a dedicated room for the storage, packaging, and labeling of trial medications, administered by our medication coordinator. The unit plans trials initiated by Neuro-SysMed PIs in collaboration with external investigators or the industry, enabling patient participation in national and international multi-centre trials. The R&D Department at HUH assists in coordinating and negotiating industry-sponsored clinical studies.

Neuro-SysMed administration

In addition to the personnel actively involved with the laboratory, data, and clinical trials coordination and management, Neuro-SysMed has a Centre Coordinator (Mona Machrouh), a Communications Officer (Eli Vidhammer), and a Research School Coordinator (Agnete Engelsen). The administration is further supported by administrative teams from the host and partner institutions regarding financial matters, HR, and general administration.

RESEARCH FUNDING

During 2025, Neuro-SysMed has maintained a high level of research activity across the Centre. This sustained commitment has strengthened scientific output, enabled the maturation of existing initiatives, and supported the development of several new projects. Together, these efforts have resulted in continued success in attracting substantial external funding from national and international sources throughout the year.

Responsible for this function: Managing Director Yamila Torres Cleuren

The Centre has experienced an exceptionally strong year, marked by strategic efforts to secure the long-term sustainability of Neuro-SysMed and ensure continuation of our initiatives beyond the original Research Council of Norway (RCN) funding period. A central priority in 2025 has been to consolidate our scientific platform, strengthen partnerships, and build a durable financial foundation for the next phase of growth.

We are proud to report substantial success in securing both international and national competitive funding. Internationally, Cure Parkinson's has awarded 15 MNOK to the SLEIPNIR project, and the EBV-MS Hop-On initiative has received 5.5 MNOK, further strengthening our international collaborations in multiple sclerosis research. In addition, SPARK-NS has granted 22 MNOK to support a new clinical trial investigating D-serine, starting a new partnership for clinical trials.

Nationally, KLINBEFORSK has awarded 25 MNOK to the HYDRA trial platform in PD and 13 MNOK to the NEMESIS project in MS (starting 2026), reinforcing our leadership in investigator-initiated clinical trials. The Norwegian Research Council has supported two new commercialisation projects, accelerating the translation of discoveries toward implementation and industry collaboration, alongside important national infrastructure grants that enhance our research capacity and shared resources.

At the regional level, Helse Vest has funded three new research positions and three open project support grants, providing essential momentum for both clinical and translational activities. The University of Bergen (UiB) has additionally supported one new PhD position, contributing to the Centre's commitment to talent development and long-term competence building.

Most importantly, 2025 marks a defining milestone for the Centre's future. Funding has been secured to continue and expand key Neuro-SysMed initiatives beyond the original RCN period. The establishment of the **Mohn Center for Neuroprotection**, supported with 50 MNOK, and the **SFI Innovation Center for Neuroresilience**, funded with 250 MNOK, ensures a robust and forward-looking platform for research, innovation, and industry collaboration in the years ahead.

These achievements reflect the strength of our interdisciplinary model and our cross-disease approach, where insights from one disorder inform progress in others. This synergy remains one of our defining strengths and a driving force behind new laboratory discoveries, clinical trials, and innovation initiatives.

Overall, 2025 has been a year defined not only by scientific progress but by strategic consolidation and sustainability, ensuring that Neuro-SysMed's impact on neurodegenerative disease research, patient care, and innovation will continue well beyond the original funding horizon.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FOR NEVROPROTEKSJON


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THE SCIENTIFIC ADVISORY BOARD

Neuro-SysMed is advised by a Scientific Advisory Board (SAB), consisting of Professors Kailash Bhatia, Raymond Koopmans, and Xavier Montalban.

Professor Kailash Bhatia is a Professor of Clinical Neurology at the Clinical and Movement Neuroscience Department at the UCL Queen Square Institute of Neurology, London, and an Honorary Consultant Neurologist at the affiliated National Hospital for Neurology (NHNN), Queen Square, UK. Professor Bhatia's main research interest is in movement disorders, merging clinical, electrophysiological, and genetic methods to study the pathophysiology of conditions like dystonia and PD.

Professor Raymond Koopmans is a Professor of Nursing Home Medicine studies at the Faculty of Medical Sciences at Radboud University, The Netherlands. Professor Koopmans studies the course of dementia in nursing home patients.

Professor Xavier Montalban is the the Chair of the Department of Neurology and Director of the Multiple Sclerosis Centre of Catalonia (Cemcat) at the Vall d'Hebron University Hospital, Barcelona, Spain, and Professor of Neurology at the Autonomous University of Barcelona. He is a key opinion leader in the field of MS and has been a PI in more than 150 clinical trials.

Neuro-SysMed's principal investigators for MS met with their SAB member during the 2025 Annual Symposium to discuss their projects, planned activities, and how they work with the rest of the Centre. This led to fruitful discussions and insightful feedback on the individual projects. In general, the SAB was very impressed with the high volume of investigator-initiated trials and their quality. Special focus should remain on high-impact studies that can continue to transform the field.

THE USER COUNCIL

Neuro-SysMed's User Council was established from the start of the Centre (2019) and serves as an advisory body with representatives from all the relevant patient organisations, with two representatives for each disease group.

The importance of the user voice in research

User involvement and user-led approaches in research and innovation processes ensure that those who truly understand the needs are able to shape the agenda. Research projects are increasingly expected to draw on the experiences and knowledge of people who live with a condition, or who are close to someone who does – those who feel the impact directly or who are in a position to closely observe how the illness and everyday life unfold.

User involvement provides a systematic way of ensuring that this expertise and perspective have a natural place and an active voice within research projects. The user perspective is valuable not only for strategic decisions made when projects are established, but also for the small yet essential details of everyday life that are crucial for ensuring that a project's design genuinely reflects the needs and challenges of those living with the diagnosis.

When funding research and innovation projects, the government expects user experience and knowledge to be part of the projects. This makes it more likely that new knowledge will reflect user requirements and that it will be implemented and used. We in the User Council find this to be an important and appropriate goal for our engagement in the Neuro-SysMed activities.

The assignment of the User Council

The User Council provides advice to the Neuro-SysMed management and contributes towards:

- developing research ideas and participating in discussions on clinical research
- recruiting user representatives for the centre's research
- ensuring equal access from across the country to participation in clinical trials
- designing user-friendly information from Neuro-SysMed
- disseminating research results
- raising awareness of the centre's work and the need for greater knowledge – about the value of participating in clinical studies for patients, as well as on user involvement more generally

The User Council wishes to help communicate information about opportunities for patients and relatives to take part in clinical trials. This remains unfamiliar to many, both among patients and healthcare professionals.

Status in the collaboration with Neuro-SysMed

The cooperation with the researchers and the administrative group is well-functioning. We experience that all parties are aiming at the best possible collaboration to include our organisations in the work of the centre. Nevertheless, there are still challenges related to user participation in the projects. Continuous efforts are needed to establish effective and practical frameworks for collaboration between researchers and users.

Activities in 2025

- Planning the Centre's participation during Arendalsuka 2025.
- Assisting the Centre in promoting studies to patient populations.
- Working on recruiting user representatives and a plan to establish a "pool" of representatives within the organisations.
- Contributing to the plan for continuation of research and the Centre's functions.
- The chair of the User Council also attended the course *Patient and Public Involvement in Medical and Health Research*, a collaboration between Neuro-SysMed, CCBIO, REMEDY, NorHEAD, MATRIX, NorCRIN, and FORMI, and supported by the Dam Foundation through the Norwegian National Association for Public Health. The course is designed to facilitate user involvement

in medical and health research and consists of lectures, group work, and discussions. The course was held in May 2025 and is intended for researchers as well as user representatives, facilitating interaction and collaboration.

Meetings held in 2025

In 2025, two meetings were held, each lasting 4–5 hours. The council members appreciate that these meetings provide sufficient time for meaningful discussion and, at least once a year, a more in-depth briefing on the projects across all four disease groups.

The same model has been decided for the meetings in 2026.

– Lise Johnsen, User Council Chair

Members of the User Council in 2025

- **Lise Johnsen**, Norwegian MS Society (Chair)
- **Ditte Staldgaard,** Norwegian National Association for Public Health (Vice Chair)
- **Kjell Grorud**, Norwegian Parkinson's Association
- **Lemia Boussaada**, Norwegian Parkinson's Association
- **Jan Anders Istad**, Norwegian MS Society
- **Kristin Reimers Kardel**, Norwegian National Association for Public Health
- **Marit Stensen**, ALS Norway Foundation
- **Nina Bjørum**, ALS Association – Always a Little Stronger (parts of the year)
- **Kari Grace Bru**, ALS Association – Always a Little Stronger (from Nov. 2025)
- **Mirjeta Emini**, Norwegian National Association for Public Health (deputy)
- **Mona Bahus**, ALS Norway Foundation (deputy)
- **Gry Lien**, ALS Association – Always a Little Stronger (deputy)
- **Helene Wangberg**, Norwegian MS Society (deputy)

The representatives on the User Council were elected in spring 2025 to serve for the rest of the Centre's operational period.

NEURO-SYSMED IN NUMBERS

The level of activity during 2025 was very similar to the previous years, with new projects starting and others approaching their last year of activity. We are continuing to increase our international funding and spent a total of 103 million NOK on Neuro-SysMed-related projects during 2025.

Neuro-SysMed funding

The core activities of Neuro-SysMed are funded through the Research Council of Norway's (RCN) Centre for Clinical Treatment Research scheme. In 2025, this amounted to 22.6 MNOK as own contribution from the consortium institutions and 21.2 MNOK from the RCN. The large volume of investigator-initiated clinical trials requires large resources in terms of personnel, infrastructure, and running costs, and therefore, additional funding has been crucial to reach this level of activity.

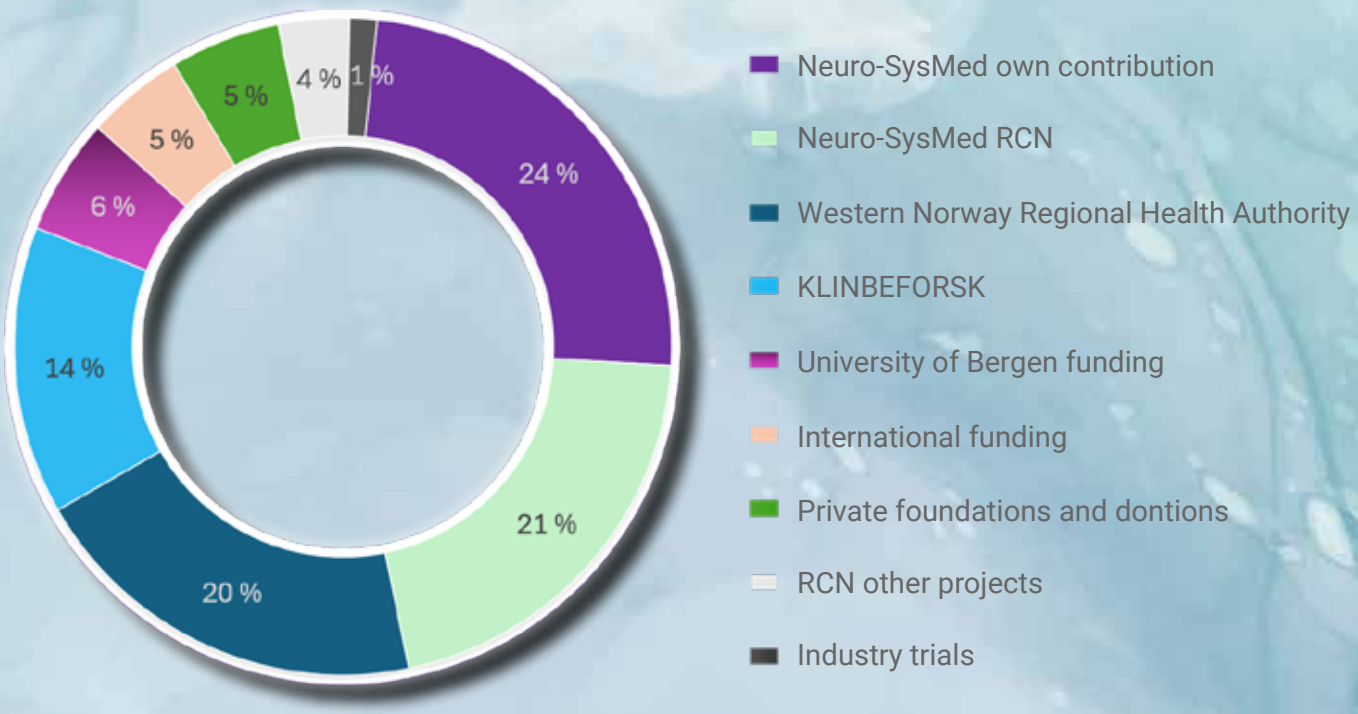
The Western Norway Regional Health Authority was the biggest funding source for 2025, with 20.6 MNOK spent, followed by the KLINBEFORSK program with 13.6 MNOK. In addition, we have several UiB-funded PhD positions, EU, UK, and US-funded projects, other RCN-funded research and commercialisation projects, private foundations and donations (including patient organisations), and income from industry trials.

Neuro-SysMed in numbers

Our teams boast a wide range of expertise, encompassing master-level and medical research students, PhD candidates, postdoctoral fellows, senior researchers, clinicians, research technicians, research nurses, clinical trial coordinators, and administrative staff.

While approximately 60% of our staff is female, there is a notable overrepresentation of men in leadership roles. To address this, we have been proactively recruiting and training women for senior positions. This initiative has led to a continuous rise in publications with female senior authorship, increased successful research funding, and more women in supervisory roles. We remain committed to supporting their careers.

Funding sources in 2025 for Neuro-SysMed projects

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INNOVATION

Innovation remains a defining pillar of Neuro-SysMed's activities in 2025, embedded not only in our adoption of advanced technologies but in our infrastructure, organisational model, and interdisciplinary way of working across clinical, experimental, and computational domains.

We continue to integrate innovative methodologies into our clinical trials and translational research, while actively cultivating an innovation mindset among early-career researchers. Through dedicated activities for students and fellows, as well as strategic discussions at our Annual Symposium, we promote new trial designs, advanced analytics, and systems medicine approaches aimed at overcoming persistent barriers to therapeutic breakthroughs in neurological diseases.

In 2025, three active commercialisation projects funded by the Norwegian Research Council (RCN) are underway within the Centre, targeting innovation in both multiple sclerosis (MS) and Parkinson's disease (PD). In addition, a proof-of-concept project supported by Digital Life Norway (DLN) is advancing a promising early-stage therapeutic concept. Together, these initiatives strengthen our translational pipeline from discovery to application and broaden our portfolio of innovation-driven activities.

Our Managing Director is leading our Research and Innovation Strategy and, in close collaboration with innovation advisors from our host and partner institutions, works systematically with principal investigators to identify commercially relevant findings and mature them toward application. This includes strategic support for intellectual property development in partnership with VIS (our technology transfer office), commercialisation roadmaps, and the structuring of proof-of-concept studies.

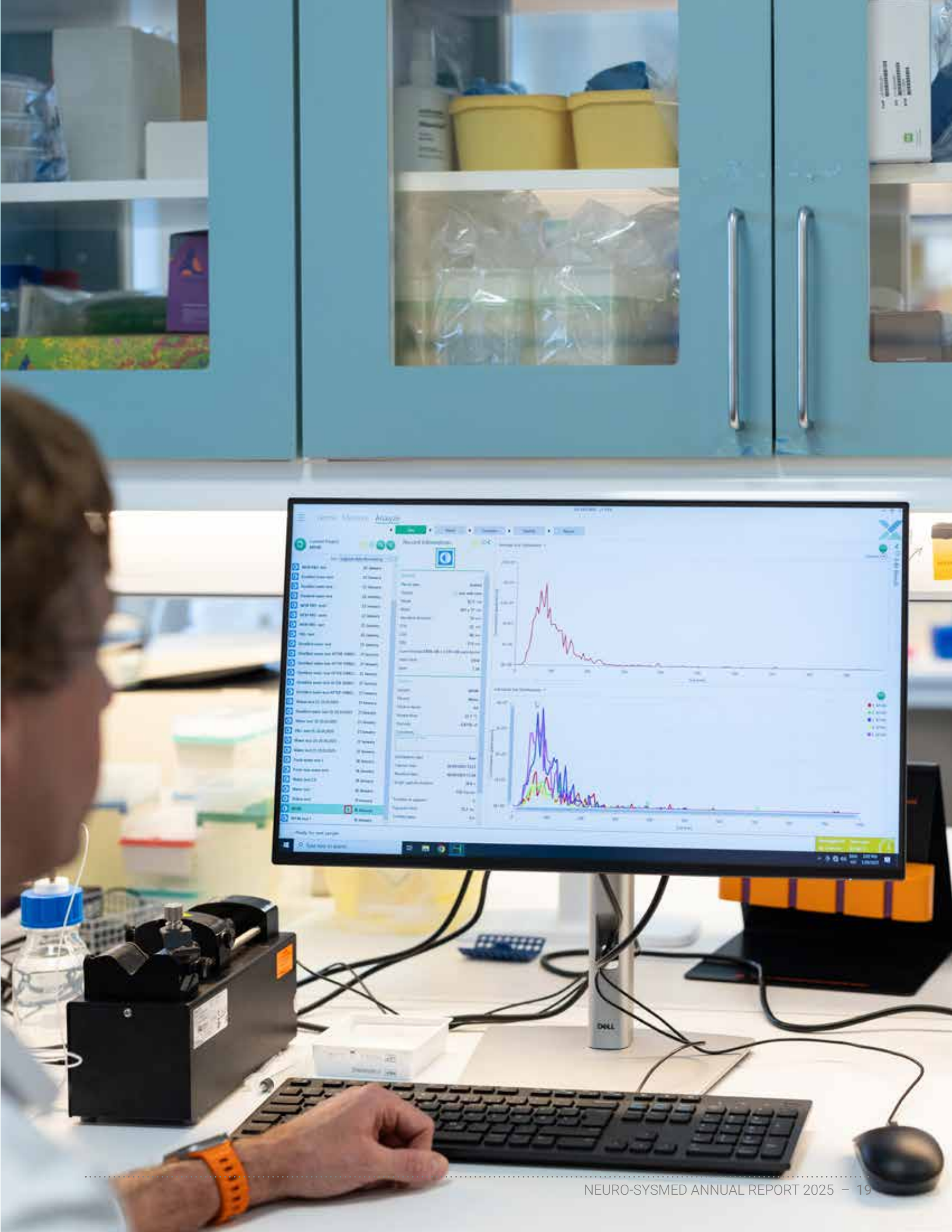
Two of our Directors, Tzoulis and Cleuren, were selected to participate in the Scandinavian REACH programme, funded by the RCN in collaboration with Innovation Norway. The programme included an intensive innovation and entrepreneurship training component, culminating in a research and industry stay in Silicon Valley. During this stay, they engaged directly with biotech companies, investors, translational hubs, and academic innovation ecosystems, gaining a first-hand insight into venture development, regulatory pathways, and international scaling strategies. Their participation has significantly strengthened our internal competence in commercialisation and global health innovation and has further expanded Neuro-SysMed's international network.

A major strategic focus in 2025 has been to intensify collaboration with industry. This has resulted in several new partnerships linked to our clinical trial platforms, positioning Neuro-SysMed as an academic partner for early-phase and mechanism-driven studies. Notably, new cross-disease collaborations have been established in the field of exosome-based therapies. These partnerships reinforce our role as a state-of-the-art testing arena for promising therapies in neurological diseases.

With several large trials concluding, significant effort has gone into developing the next generation of adaptive and platform-based trials. The conclusion of the OVERLORD-MS trial clearly supports continued use of off-patent rituximab, a substantial social innovation that will reduce annual MS treatment costs by over NOK 500 million. The HYDRA study, a multi-arm, multi-stage (MAMS) platform trial in PD, represents a flagship example of this strategy. Developed in close collaboration with Norwegian hospitals, statistical experts, and international partners with experience from similar UK and French platforms, HYDRA strengthens national coordination and accelerates the evaluation of multiple treatments simultaneously.

Importantly, innovation efforts in 2025 are closely aligned with the newly funded SFI Innovation Center for Neuroresilience. The SFI provides a long-term framework for structured collaboration between academia, healthcare, and industry, with innovation, commercialisation, and sustainable value creation at its core. This positions Neuro-SysMed not only as a research centre of excellence, but as a driving force in building Norway's neuro-health innovation ecosystem.

Overall, 2025 has been characterised by a strong and deliberate push toward translational acceleration, internationalisation of innovation competence, and deeper industry integration –ensuring that scientific discoveries are effectively transformed into solutions that benefit patients and society.



NEURO-SYSMED VIEWPOINT

Author: Natalia Drosu, Massachusetts General Hospital in Boston, MA

International Collaboration with Neuro-SysMed

I am a postdoctoral fellow at the Massachusetts General Hospital in Boston, working on immune responses to EBV that may play a pathogenic role in multiple sclerosis. Two years ago, we started a collaboration with Neuro-SysMed at Haukeland University Hospital and the University of Bergen, which has now expanded to cover several projects on EBV and MS. This collaboration has been very productive and continues to yield important insights.

Understanding the relationship between EBV and MS represents one of the most important challenges in neurological research today. While EBV infects more than 90% of adults worldwide, recent studies have demonstrated that EBV infection dramatically increases the risk of developing MS, suggesting the virus plays a causal role in disease onset. Despite this critical link, the mechanisms by which EBV contributes to MS pathogenesis remain incompletely understood. Unravelling these mechanisms could open new avenues for therapeutic intervention and potentially even disease prevention, making this research essential for the millions of people affected by MS worldwide.

What makes Norway truly exceptional as a research partner is the unique access to patients and biological samples through the comprehensive national health registries and biobanks. The ability to work with unique, well-characterized cohorts of MS patients with extensive longitudinal follow-up data has enabled us to answer research questions about EBV's role in MS that simply cannot be addressed elsewhere. This infrastructure has allowed us to validate our findings across diverse clinical cohorts and translate our discoveries into meaningful insights for patients.

The willingness to collaborate and share expertise has made this partnership particularly rewarding. The strong academic environment at Neuro-SysMed encourages open exchange of ideas and methods across research groups. We have been able to share cutting-edge techniques for detecting EBV-specific immune responses, learn from each other's approaches, and collectively push the boundaries of what we understand about EBV and MS. The multidisciplinary collaboration, bringing together virologists, immunologists, neurologists, and bioinformaticians, has enriched our research in ways that would be difficult to achieve within a single institution.

This experience has shown me that working together across institutions and borders achieves far more for science than any of us could accomplish working alone. Our joint work has already yielded insights that are shaping how we think about disease causation and potential therapeutic targets, and this collaboration has reinforced that international partnerships are essential for advancing complex questions in biomedical research and ultimately improving outcomes for patients.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NEURO-SYSMED VIEWPOINT

Author: Charalampos Tzoulis, Neuro-SysMed

Academic Clinical Trials: A Strategic Investment in Norway's Health Innovation Future

Norway has ambitious goals for patient access to innovative treatments, international research excellence, and growth in the health industry. Reaching these goals requires a strong and balanced clinical research ecosystem – one where academic and industry-sponsored trials work hand in hand.

Industry-sponsored studies are indispensable. They connect Norway to global development pipelines and provide patients with access to promising new therapies. At the same time, academic clinical trials are a strategic investment in national competence, infrastructure, and long-term value creation, while ensuring that patients have access to experimental therapies driven by medical need, rather than market considerations. Together, industry- and academia-sponsored trials form a mutually reinforcing system that benefits patients, healthcare services, and industry alike.

So, why are academic trials of vital importance?

Patient access to trials requires institutional excellence and clinical trial capacity

Early access to innovative therapies does not happen in isolation. It depends on whether hospitals have the expertise, infrastructure, and experience needed to run trials safely, efficiently, and at high quality. When that capacity is strong, patients are offered participation in scientifically leading studies, while at the same time, Norway becomes a trusted partner for international research, including industry-sponsored trials.

Academic clinical environments contribute by:

- advancing clinical and molecular understanding of disease
- defining the appropriate patient populations, mechanisms, and meaningful endpoints for each therapy tested
- designing studies that address real clinical needs in everyday practice
- building recruitment culture and robust trial infrastructure within hospitals
- establishing biobanks, registries, and high-quality data systems

This foundation strengthens Norway's ability to participate in global development programmes and makes collaboration with industry more efficient and attractive.

A trial ecosystem enabling early-stage therapeutic development

A significant share of medical innovation originates in academia and small and medium-sized enterprises. These companies often have strong ideas and early data, but lack the infrastructure and resources needed to run rigorous clinical studies at scale. Larger

pharmaceutical companies typically engage later, once there is clear proof-of-concept and the scientific and operational risk has been reduced. Investigator-initiated trials play a crucial bridging role in this process, as they:

- bring promising therapeutic candidates into early clinical testing
- generate high-quality proof-of-concept data
- evaluate treatment effects in well-defined, clinically relevant populations
- build the evidence base that supports further investment and scale-up

In this way, academic trials reduce uncertainty and accelerate the pathway from scientific discovery to commercial development and patient benefit.

Building capacity that attracts collaboration

Strong academic clinical research builds precisely the capabilities that global partners look for:

- Professional clinical trial units (CTUs) and experienced study personnel
- Efficient regulatory and contractual processes
- National recruitment networks capable of rapid inclusion
- High methodological competence and robust data capture

Investments in academic trials strengthen these capacities across hospitals and regions. This not only benefits publicly initiated research but also enhances Norway's attractiveness as a site for international industry-sponsored studies.

Public investment with long-term returns

Academic clinical trials require public funding, yet they should be recognised as strategic long-term investments – on par with education, digital infrastructure, and advanced healthcare services. Their impact grows over time, generating compounding benefits for patients, hospitals, and the wider innovation ecosystem.

The return on this investment is multifaceted:

1. **Patient benefit:** Academic trials address clinically important questions beyond initial drug approval – optimising existing treatments, testing combinations, refining treatment sequencing, and generating long-term outcome data.
2. **Independence and trust**: Investigator-initiated studies are driven by patient and health system needs, strengthening confidence in the evidence base that informs clinical practice.
3. **Repurposing and efficiency**: Academic environments frequently test established, off-patent drugs for new indications. With known safety profiles, these therapies can reach patients more rapidly and cost-effectively.
4. **National assets**: Data platforms, biobanks, digital tools, protocols, and trial networks become valuable national resources that can be further developed and commercialised.
5. **Industry growth**: A strong academic research environment creates opportunities for partnerships, spin-offs, and innovation-driven companies, contributing to the growth of Norway's health sector.

A shared agenda for growth

Norway's strengths – high-quality health data, national registries, strong public trust, and well-organised healthcare services – provide a unique foundation for clinical research. By investing more in investigator-initiated trials while fostering close, professional collaboration with industry, Norway can strengthen its position as a competitive and innovative health nation.

The path forward is not about choosing between academic and industry trials. It is about recognising that academic clinical research is a cornerstone of a vibrant health innovation ecosystem – one that accelerates patient access, attracts international partners, and drives sustainable growth in the health sector.

A strong academic trial landscape does not compete with industry – it empowers it.

NEURO-SYSMED VIEWPOINT

Author: Yamila Tores Cleuren, Neuro-SysMed

Neurotechnology: A Strategic Opportunity for Norway

Neurotechnology is rapidly emerging as one of the most transformative fields in medicine and health innovation, moving from the laboratory to real-world application. Internationally, it is recognized not only as a frontier of neuroscience but as a strategic domain at the intersection of health, artificial intelligence, engineering, and ethics. For Norway, we believe this represents a rare window of opportunity: to position the country as a leader in responsible, clinically integrated neurotechnology.

Neurotechnology is more than devices

While often associated with implants or hardware, neurotechnology encompasses a broad and rapidly evolving landscape: technologies that interact directly with the nervous system, measuring, recording, modulating, or influencing brain and neural activity. The common denominator is integration: combining biological insight, computational power, and clinical application into solutions that can meaningfully improve patient outcomes. This includes advanced neuroimaging, AI-driven analytics, digital biomarkers, wearable and home-based monitoring, neuromodulation, and adaptive intervention platforms.

Neuro-SysMed and neurotechnology?

By integrating clinical trials, molecular profiling, neuroimaging, digital measures of sleep or movement, computational analysis, and translational research, Neuro-SysMed already operates within a framework aligned with international neurotechnology priorities.

Some areas where Neuro-SysMed can excel include:

- AI-driven stratification of patients based on multimodal data
- Digital biomarkers derived from home-based monitoring and wearables
- Precision neuromodulation tailored to molecular subtypes
- Targeted delivery platforms
- Adaptive clinical trial designs embedding technological validation

These capabilities place Norway at the forefront of a global trend towards data-driven, patient-centred, and ethically responsible neurotechnology.

What positioning requires

To capitalise on this opportunity, Norway needs coordinated ambition:

1. **National Neurotechnology Platforms**: Establish integrated platforms linking imaging, omics, digital biomarkers, neuromodulation, and AI analytics within clinical environments.
2. **Long-Term Funding and Infrastructure:** Neurotechnology development requires stable investment horizons, not fragmented short-term calls.

3. **Academia–Industry Co-Development**: Create structured collaboration models where academic insight, clinical validation, and industrial scalability are aligned from early stages.
4. **International Alignment**: Actively engage with global initiatives such as the BRAIN Initiative and European research frameworks, ensuring Norwegian environments are embedded in international consortia.
5. **Talent Development**: Train a new generation fluent in neuroscience, engineering, data science, clinical medicine, and ethics.

With strong health data systems, coordinated clinical infrastructure, high public trust, and interdisciplinary centres such as Neuro-SysMed already operating within a systems medicine framework, Norway has the prerequisites.

Neurotechnology is not merely a research trend. It is a strategic domain at the intersection of health, industry, ethics, and digital transformation. Countries that act now, decisively and coherently, will define the standards and capture the value.

Norway is well-positioned. The question is whether we treat neurotechnology as an incremental addition or as the strategic opportunity it truly represents.

NEURO-SYSMED VIEWPOINT

Authors: Kjell-Morten Myhr & Øivind Torkildsen, Neuro-SysMed

High-Efficacy Multiple Sclerosis Therapy at a Sustainable Cost

Today, most individuals newly diagnosed with multiple sclerosis (MS) in Norway are offered early high-efficacy therapy – most often with rituximab. This treatment strategy, which has transformed MS care in Norway while substantially reducing healthcare costs - has largely been shaped by research and clinical initiatives from the Bergen MS Research Group.

Since the early 1990s, when the first disease-modifying therapies for multiple sclerosis (MS) became available, the Bergen MS Research Group has played a central role in shaping MS treatment in Norway. Our group has led and participated in numerous academic and industry-sponsored clinical trials, ensuring that Norwegian patients gain early access to innovative therapies.

From Early Medications to Modern Therapies

The Research Group initially worked with modest-efficacy therapies such as interferon-beta. Over time, we have led or contributed to trials of more than twenty therapeutic agents across more than fifty clinical studies. Our research efforts, both within Norway and in broader Scandinavian collaborations, have consistently focused on improving treatment strategies and optimizing patient outcomes.

When evidence of B-cell depletion with rituximab first emerged in 2008, we began offering the therapy to patients with ongoing disease activity despite standard treatment. Strong clinical results led to the development of structured dosing protocols and systematic monitoring through the Norwegian MS Registry. At the same time, we coordinated national participation in the development of ocrelizumab, gaining extensive experience across the entire class of B-cell–targeted therapies.

Responding Strategically to Rising Costs

With the FDA (2017) and EMA (2018) approval of ocrelizumab – an effective but substantially more expensive treatment – we recognized a significant sustainability challenge for the healthcare system. In response, we launched a coordinated, forward-looking strategy to secure long-term access to high-efficacy therapy at a sustainable cost:

- **Initiating a national health technology assessment** of MS therapies, including rituximab
- **Proposing and conducting the OVERLORD-MS trial**, a large, randomized, double-blind non-inferiority study comparing rituximab and ocrelizumab
- **Updating Norway's national MS treatment guidelines** to include rituximab as a recommended option
- **Carrying out extensive real-world studies** on rituximab's safety and effectiveness in clinical practice
- **Collaborating internationally through the Multiple Sclerosis International Federation (MSIF)** to promote global access to affordable, high-efficacy MS therapies

Shaping MS Care in Norway – and Beyond

One of our group's most significant contributions has been this evidence based long-term, off-label use of rituximab, a highly effective B-cell therapy. Over more than a decade, we have demonstrated that rituximab offers strong clinical benefit at a fraction of the cost of comparable approved medications – while maintaining rigorous quality control and outcome monitoring. The recent results from the OVERLORD-MS trial have confirmed the **non-inferiority of rituximab compared with ocrelizumab.**

This evidence-driven approach has influenced national policy: rituximab is now permanently included in Norway's MS treatment guidelines. As a result, early high-efficacy therapy has become the standard initial treatment strategy for most individuals newly diagnosed with MS in Norway. The economic impact is substantial: by 2026, approximately five thousand people with MS are receiving rituximab, yielding an estimated **annual cost reduction of 500 million NOK** for Norwegian hospitals.

Through this scientific rigor, patient-centred care, and an ongoing commitment to cost-effective treatment, the Bergen MS Research Group has transformed MS management in Norway. Our work also contributes internationally – most notably through MSIF's successful effort to include MS therapies on the **WHO Essential Medicines List** – helping ensure that effective treatments become accessible to patients worldwide.

RESEARCH SCHOOL
IN TRANSLATIONAL NEUROSCIENCE

The Neuro-SysMed Research School in Translational Neuroscience offers a wide range of PhD courses. These are organised by our research nodes and cover our various fields, ensuring high-quality education for PhD candidates and other students, building a strong foundation for their future research and careers.

The Research School provides PhD candidates with relevant courses to meet the mandatory ECTS requirements of the University of Bergen's PhD training programme. Equally important, the Research School strives to create an inspiring and inclusive educational environment that motivates ambitious future research projects among junior scientists and established senior researchers alike, while supporting the establishment of strong scientific networks for career advancement.

The Neuro-SysMed Research School in Translational Neuroscience is coordinated by Agnete Engelsen, in collaboration with the Neuro-SysMed management. Most courses are open to researchers, postdoctoral fellows, PhD candidates, Master's students, participants in the Medical Student Research Programme, and others with an interest in the topics.

Currently, we have 7 established courses providing PhD candidates with a total of 19 ECTS:

- NEUROSYSM910, the Neuro-SysMed Junior Scientist Symposium, 3 ECTS (started 2023, running continuously).
- NEUROSYSM920, Neuro-SysMed Seminars and Symposium, 3 ECTS (started 2022, running continuously).
- NEUROSYSM930, Applied Bioinformatics and Data Analysis in Medical Research, 3 ECTS (started 2022, running annually).
- NEUROSYSM940, The Nature of Disease and Suffering and the Goals of Precision Medicine, 2 ECTS (started 2023, running on demand).
- CCBIONEUR910, Patient and Public Involvement in Medical and Health Research, 2 ECTS (started 2021, running annually).
- CCBIONEUR911, Clinical Trials, 2 ECTS (started 2021, running on demand).
- CCBIONEUR912, Health Innovation, 4 ECTS (started 2021, running on demand).

NEUROSYSM910, Neuro-SysMed Junior Scientist Symposium

This course is designed to equip PhD candidates and other students with essential skills in oral presentation, effective communication of their research, and constructive peer feedback. The course is organized as one-day seminars, offered twice per semester. Students earn 3 ECTS points upon successful completion of the course. For further details, see the dedicated chapter on the Junior Scientist Symposium.

NEUROSYSM920, Neuro-SysMed Seminars and Symposium

This course combines monthly seminars with a compulsory two-day international Neuro-SysMed Symposium held each autumn at Solstrand Hotel. Its objective is to provide a deeper understanding of research within Neuro-SysMed's focus areas - MS, PD, dementia, and ALS - as well as treatment strategies for these conditions. Participants gain insight into these diseases, learn how clinical trials and treatment strategies are designed and conducted, become familiar with terminology and methods across a broad spectrum of scientific practice, develop the ability to critically evaluate research communication, and learn about state-of-the-art scientific breakthroughs at Neuro-SysMed and their collaborators. Students earn 3 ECTS points upon successful completion of the course.

For more details, see the chapters on the 2025 Seminars and the 2025 Annual Symposium.

NEUROSYSM930, Applied Bioinformatics and Data Analysis in Medical Research

This course focuses on practical aspects and methodological considerations necessary when dealing with human-derived data, such as data sensitivity, limited sample sizes, sample misclassification, choice of appropriate statistical models, covariates, and tissue heterogeneity. The course is highly beneficial for participants with a research interest in bioinformatics, biology, medicine, or clinical research in general. Students earn 3 ECTS points upon successful completion of the course. NEUROSYSM930 was organised for the fourth time in December 2025.

NEUROSYSM940, The Nature of Disease and Suffering and the Goals of Precision Medicine

This course examines how precision medicine (PM) is transforming medical research and practice by tailoring healthcare to the individual. It provides valuable knowledge and understanding about key features and concepts related to PM, suffering, disease, and health in different research traditions. Through seminars, articles, and real-life examples, participants learn to reflect on the implications of PM for science and society. Practical case discussions, based on the participants' own work, ensure that theory is connected to real-world experience, fostering critical thinking and interdisciplinary dialogue. Students earn 2 ECTS points upon successful completion of the course. The course is planned for the third time in March and April 2026.

CCBIONEUR910, Patient and Public Involvement in Medical and Health Research

This course focuses on increasing patient and public involvement in biomedical research and provides practical methods for engaging user representatives. Such involvement is proven to enhance the relevance and impact of medical research, and the course aims to strengthen the participants' ability to assess and communicate its value, as well as implement effective strategies in their own projects. The programme combines plenary discussions, group work with user representatives and patient organisations, and

presentations from national and international experts. The course is a collaboration between CCBIO, Neuro-SysMed, REMEDY, NorHEAD, MATRIX, NorCRIN, and FORMI, supported by the Dam Foundation through The Norwegian Health Association. Students earn 2 ECTS points upon successful completion of the course. The course was organised for the fourth time in May 2025.

CCBIONEUR911, Clinical Trials

This course provides participants with a Good Clinical Practice (GCP-R3) certificate and offers a comprehensive introduction to clinical trials, covering everything from study design and ethics to practical trial management and regulatory requirements. Key topics include the perspectives of pharmaceutical companies and patients, GCP principles and recent updates, protocol development, applications and funding, contracts, and success factors for trial implementation. The course also addresses translational research protocols, integrating trials into routine clinical operations, and explores future directions in clinical research. Using examples from cancer and neurological studies, the programme combines theory with practical insights. Students earn 2 ECTS points upon successful completion of the course. The course is a collaboration between CCBIO and Neuro-SysMed, planned for the third time in January 2026.

CCBIONEUR912, Health Innovation

This course aims to teach PhD candidates and researchers to recognise the link between research findings and innovation potential. The course was established as a collaborative effort between the Research Schools of Neuro-SysMed and CCBIO and benefit from showcasing examples from local and international research environments on both neurodegeneration and cancer, with various inspirational pathways from idea to patent and beyond. Participants learn how to identify and assess innovation opportunities within their own projects, gain insight into intellectual property right strategies, and explore alternative routes for translating research into impact. The course combines inspirational talks with practical guidance on commercialisation processes and relevant assignments, aiming to foster an innovation mindset among early-career researchers. Students earn 4 ECTS points upon successful completion of the course. The next course is planned for the autumn semester of 2026.

2025 course activities

In 2025, we hosted the established courses NEUROSYSM910, NEUROSYSM920, and NEUROSYSM930, and in collaboration with CCBIO, we organised CCBIONEUR910.

Since May 2025, Agnete S. T. Engelsen replaced Nina Grytten Torkildsen as the coordinator of The Neuro-SysMed Research School in Translational Neuroscience. Neuro-SysMed welcomes Engelsen on board and wish to thank Torkildsen for her great efforts with the organization of Research School activities over the years.

"The Neuro-SysMed Research School in Translational Neuroscience has an extensive course portfolio, and in particular, the Junior Scientist Symposium series provides a unique platform for PhD students and early-stage career researchers to meet regularly and discuss scientific discoveries. I would like to express my gratitude to the Neuro-SysMed leadership and the team of course leaders and coordinators for their dedicated efforts to sustain and further develop the research school activities in 2025. The Neuro-SysMed Research School in Translational Neuroscience fulfils its purpose by providing relevant training and creating a strong sense of community within Neuro-SysMed, fostering interdisciplinary collaborations."

Agnete Engelsen

NEURO-SYSMED SEMINARS

Neuro-SysMed Seminars

The overarching aim of the Neuro-SysMed Seminars is to share knowledge between the research nodes and the different research disciplines within Neuro-SysMed, as well as to provide professional updates from invited scientists. The seminar series began in May 2022 with monthly events, during which PIs at Neuro-SysMed present ongoing research projects or invite local, national, or international speakers to deliver talks on Neuro-SysMed-related topics.

The seminars open with an informal lunch, facilitating social interactions between the research groups, networking, and discussions between all members of the interdisciplinary research groups. The seminars are also open to other research environments and visiting researchers.

The seminar series is part of the Neuro-SysMed Research School of Translational Neuroscience under the subject code NEUROSYSM920, covering both the Neuro-SysMed Seminars and the Annual Symposium. Participation with completion of mandatory assignments provides 3 ECTS credits for members of the Neuro-SysMed Research School.

The list of seminars organized during 2025 covers a wide range of topics, including additional special seminars.

JAN 22 — Professor **Ole-Bjørn Tysnes** (MD, PhD), Principal Investigator (PI) for the ALS node, HUH and UiB. Title of the talk: *About ALS management and new emerging treatments.*

FEB 12 — Professor **Bettina Husebø** (MD, PhD), PI for the Care Node, UiB; Postdoc **Zoya Sabir** (PhD), PhD Candidate **Haakon Reithe** (MSc), Postdoc **Valentina Casadei** (PhD), and Postdoc **Kamilla Haugland-Pruitt** (PhD), Care Node. Title of the talk: *TECH-CARE.*

MAR 5 — Professor **Roger Strand** (Dr. Scient.), Centre for the Study of the Sciences and the Humanities, and CCBIO, UiB. Title of the talk: *The Complexity of Medical Phenomena.*

MAR 17 — Extra Seminar with Biotechnologist **Fabio Moda** (PhD), the University of Milan/the Fondazione IRCCS Istituto Neurologico Carlo Besta, and Health Researcher **Arianna Ciullini** (MSc), the Fondazione IRCCS Istituto Neurologico Carlo Besta. Title of the talk: *Hunting down misfolded proteins: seed amplification assays in neurodegenerative diseases.*

MAY 7 — Extra Seminar with Professor **Christos Proukakis** (BM BCh, PhD), University College London Institute of Neurology, and the Royal Free Hospital, London. Title of the talk: *Somatic mutations in synucleinopathies.*

MAY 21 — Professor **Aurora Martinez** (PhD), Co-PI for the Drug Discovery Node, UiB, and Postdoc **Gloria Gamiz** (PhD), Drug Discovery Node. Title of the talk: *Screening and development of drugs for neurological targets.*

JUN 4

Professor **Charalampos Tzoulis** (MD, PhD), Neuro-SysMed Director, PI of the PD Node, HUH and UiB, and Senior Researcher **Christian Dölle** (PhD), PD Node. Title of the talk: *NAD Augmentation as a Disease-Modifying Strategy for Neurological Diseases.*

JUN 25

Extra Seminar hosted by Associate Professor **Antony Cooper** (PhD), Research Director at the Australian Parkinson's Mission, Garvan Institute of Medical Research, and UNSW Sydney, School of Clinical Medicine, Australia. Title of the talk: *Different Disease Pathways to Idiopathic Parkinson's Disease: Three Genetically Defined Subgroups with Different Treatment Responses in Phase III Disease-Modifying Trials and Distinct Clinical Trajectories.*

AUG 27

Associate Professor **Kristoffer Haugarvoll** (MD, PhD) and Associate Professor **Ragnhild Eide Skogseth** (MD, PhD), PIs of the Dementia Node, HUH and UiB. Title of the talk: *Stratification of Dementia and Enhancement of NAD⁺ levels in Alzheimer's disease.*

SEP 17

Senior Researcher **Gonzalo S. Nido** (PhD) and Senior Engineer **Dimitrios Kleftogiannis** (PhD), PIs of the Systems Biology & Bioinformatics Node, UiB. Title of the talk: *Single-cell omics in the study of neurodegenerative disorders.*

OCT 15

Senior Engineer **Julia Romanowska** (PhD), Researcher **Julia Tuominen** (PhD), and PhD Candidate **Magne Haugland Solheim** (MSc) from Neuro-SysMed's Drug Discovery Node, UiB. Title of the talk: *Registry-based screening to identify repurposing candidates and the prodrome of neurodegenerative diseases.*

NOV 12

Professor **Trygve Holmøy** (MD, PhD), Department of Neurology, Akershus University Hospital, and Institute of Clinical Medicine, University of Oslo. Title of the talk: *Neurofilament Light Chain as a Disease Marker and Outcome Measure in Neurological Diseases.*

DEC 10

Professor **Charalampos Tzoulis** (MD, PhD), Neuro-SysMed Director, PI of the PD Node, HUH and UiB. Title of the talk: *Is there a mitochondrial subtype of Parkinson's disease?*

THE NEURO-SYSMED ANNUAL SYMPOSIUM

The Neuro-SysMed Annual Symposium 2025 was held on November 18–19 at Solstrand Hotel, close to Bergen, and brought together more than 150 participants from national and international research environments. As Neuro-SysMed's principal scientific meeting and an integral component of the NEUROSYSM920 course within the Neuro-SysMed Research School for Translational Neuroscience, the symposium plays a key role in disseminating the centre's research activities, strengthening strategic collaborations, and providing learning opportunities for students and early career researchers.

The symposium was preceded by a full day of structured meetings involving the **EBV-MS consortium** and dementia research groups, with participation from patient organisations. The EBV-MS consortium, coordinated by Neuro-SysMed and funded through the Horizon Europe program, represents a significant multinational effort to clarify the role of Epstein–Barr virus in multiple sclerosis. The pre-meetings underscored the importance of coordinated research infrastructures and highlighted ongoing efforts to advance collaborative approaches to complex neurological diseases.

Day 1: Progress Toward Disease Prevention

The first day of the symposium focused on advances in preventive strategies for neurodegenerative and neurological disorders. Presentations by **Christian Münz** (Zürich), **Gavin Giovannoni** (London), and **Fredrik Piehl** (Stockholm) provided updated insights into emerging opportunities for preventing MS. These developments are followed with considerable interest across related research fields.

Further contributions from **Alberto Ascherio** (Boston), **Arcadi Navarro Cuartiellas** (Barcelona), and **Johannes J. Gaare** (Bergen) broadened the perspective to prevention in other neurodegenerative conditions. Ascherio emphasized the urgent need for rigorous longitudinal studies to clarify the role of viral infections in Alzheimer's disease and to pave the way for preventive interventions. Navarro highlighted integrated strategies for lifelong brain health, early detection, and personalized prevention, while Gaare brought insights from Neuro-SysMed's NOR-RBD study that aims to develop biomarkers for prediction and risk stratification regarding future disease development.

The day concluded with research updates from several Neuro-SysMed projects, including positive new findings from the Phase 2/3 OVERLORD-MS trial presented by **Øivind Torkildsen**, showing that rituximab and ocrelizumab are equally effective for relapsing MS. This study has contributed to including rituximab in national guidelines, and it is now adopted by hospitals nationwide, giving access to high-efficacy treatment to all newly diagnosed MS patients from day one.

Day 2: Collaborative Platforms and Innovation in Clinical Trials

The second day highlighted platform-based research and novel clinical trial methodologies across MS, PD, ALS, and dementia. International contributors presented established and emerging platform models from the United Kingdom, including:

- **MND-SMART** for motor neuron disease (**Suvankar Pal,** Edinburgh)
- **EJS ACT-PD**, a national Parkinson's platform trial (**Thomas Foltynie**, London; **Camille Carroll**, Newcastle)
- **AD-SMART**, a coordinated Alzheimer's disease trial framework (**Paresh Malhotra**, London)
- **OCTOPUS**, a large multi-arm, multi-stage trial for progressive MS (**Jeremy Chataway**, London)

Xavier Montalban (Barcelona) provided strategic perspectives on optimal trial design in the context of high-efficacy MS therapies. Neuro-SysMed followed up with **Charalampos Tzoulis'** presentation of the SLEIPNIR and HYDRA platform initiatives for PD, creating an integrated pipeline from mechanistic rationale to late-stage efficacy within a harmonized national infrastructure. **Marcus Werner Koch** (Calgary) discussed the use of Simon Two-Stage futility trial designs to accelerate Phase 2 testing in progressive MS, Alzheimer's, and PD, offering a cost-effective way to screen promising treatments and improve trial efficiency.

Poster Session and Awards

The poster session comprised 29 scientific posters covering a broad range of ongoing research activities by students and early-career researchers at Neuro-SysMed and collaborators.

- The **Audience Award** was presented to **Julia Saltyte Benth** (Neuro-SysMed PD Node) for her study on how PD enhances sex differences in semantic fluency and processing speed.
- The **Committee Award** was granted to **Casper Sandvik** (Neuro-SysMed MS Node) for his work on characterization and regenerative properties of small extracellular vesicles from transdifferentiated mesenchymal stem cells in MS.

We are now looking forward to the 2026 Neuro-SysMed Annual Symposium, set on November 30 and December 1, also this time at Solstrand Hotel.

> *The Annual Symposium was two days of invigorating science and inspiring discussions and new collaborations - exactly what a science meeting should be about. We are immensely grateful to all speakers - local and international - and our colleagues who made sure the meeting ran smoothly.*
>
> *Charalampos Tzoulis*

SCIENTIFIC PROGRAM

Day 1: Tuesday, November 18, 2025

Neuro-SysMed
Annual Symposium

09:00-10:20	Registration and coffee
10:20-10:30	**Centre Director Charalampos Tzoulis, Co-Director Kjell-Morten Myhr, and Managing Director Yamila Torres Cleuren**: Welcome
SESSION 1: PREVENTION IN MS, chair: Øivind Torkildsen	
10:30-11:00	**Christian Munz**: (BEHIND-MS consortium): EBV infected B cells as trailblazers for inflammatory lymphocytes into the CNS
11:00-11:30	**Gavin Giovannoni**: EBV theory to practice - pragmatic ways to prevent MS
11:30-12:00	**Fredrik Piehl**: Optimizing B-cell depletion: dosing, intervals and preventive potential
12:00-13:00	*Lunch break*
SESSION 2: PREVENTION IN NEURODEGENERATION, chair: Charalampos Tzoulis	
13:00-13:30	**Alberto Ascherio**: Viral infections and risk of Alzheimer disease
13:30-14:00	**Arcadi Navarro Cuartiellas**: Ageing and Alzheimer's; the need for a revolution in Brain Health
14:00-14:30	**Johannes J. Gaare**: NOR-RBD; a Norwegian longitudinal cohort of prodromal α-synucleinopathy
14:30-15:00	*Coffee break*
SESSION 3: BREAKING NEWS, chair: Xavier Montalban	
15:00-15:25	**Øivind Torkildsen**: OVERLORD-MS: Ocrelizumab versusrituximab off-label at the onset of relapsing MS disease
15:25-15:40	**Charalampos Tzoulis**: NOPARK and N-DOSE: from recruitment to database lock
15:40-15:55	**Christopher Elnan Kvistad**: SMART-MS:Study of mesenchymal autologous stem cells as regenerative treatment for MS
15:55-16:10	**Christian Dölle**:NADbrain: A pharmacokinetic study of NAD augmentation in blood and brain
18:00-19:30	**POSTER SESSION**
19:30	*Dinner*



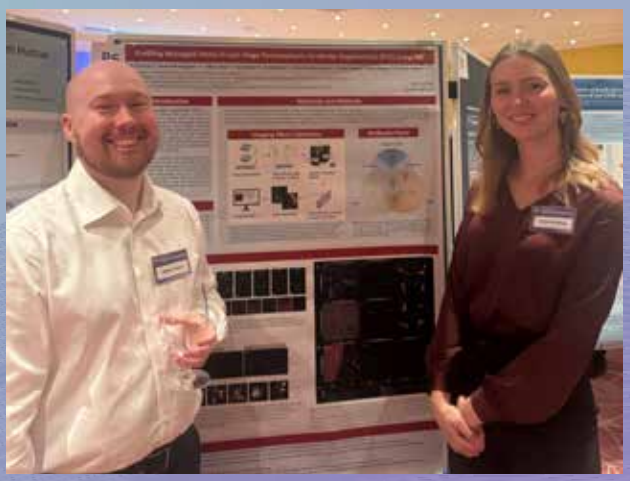


Day 2: Wednesday, November 19, 2025

Neuro-SysMed
Annual Symposium

SESSION 4: PLATFORM TRIALS & OTHER DESIGNS, chair: Kjell-Morten Myhr

09:00-09:30	**Suvankar Pal**: MND SMART: Motor Neuron Disease Systematic Multi Arm Adaptive Randomised trial – Delivering innovative, efficient, and definitive trials for people with MND
09:30-10:00	**Thomas Foltynie & Camille Carroll**: A Multi-Arm, Multi-Stage Platform trial for Parkinson's disease - EJS ACT-PD
10:00-10:30	**Paresh A. Malhotra**: AD-SMART: Preparing a platform trial in clinical Alzheimer's Disease
10:30-10:50	*Coffee break*
10:50-11:20	**Jeremy Chataway**: The OCTOPUS trial: a MAMS trial in Progressive Multiple Sclerosis – design and implementation
11:20-11:50	**Xavier Montalban**: The "ideal trial design" in the era of high-efficacy therapy for MS
12:00-13:00	*Lunch break*
13:00-13:30	**Charalampos Tzoulis**: Norwegian platform initiatives in PD: SLEIPNIR & HYDRA
13:30-14:00	**Marcus Werner Koch**: Phase 2 futility trials in neurological diseases
14:00-14:15	Closing remarks and poster prizes



JUNIOR SCIENTIST SYMPOSIUM

The Junior Scientist Symposium series provides PhD candidates and other students with an opportunity to gain valuable skills in oral presentation techniques and provides a supportive arena for the students to present their own research and give constructive feedback to their peers.

A main ambition for the Junior Scientist Symposium is to strengthen the scientific community and encourage candidates to establish a collaborative network with other scientists. The symposia are organised four times annually, twice each semester. Each symposium is normally organised with a keynote lecture, followed by four PhD candidates/postdoctoral researchers presenting results from their own research projects. Subsequently, there are final discussions, and the organizers pay special attention to provide feedback on presentation techniques and the quality of the research presentations.

Shamundeeswari Anandan and Yola Gerking hold the academic responsibility for the course, and Casper Eugen Sandvik and Håkon Olsen are coordinators. The course coordinators or other PhD students act as chairs of the symposia.

Participation in a minimum of four symposia is required for the completion of the course, in addition to approval of four submitted written scientific reports evaluating the scientific presentations at the symposia. Successful completion also requires oral presentation of the student's own research at one of the symposia. Students earn 3 ECTS points upon successful completion of the course.

The symposia in 2025 highlighted key developments in neurodegenerative research, featuring keynotes on the application of AI in research, data interpretation, regenerative medicine, and career development. Student presentations covered a wide range of topics, including digital and wearable technologies in dementia care, nutritional and behavioural monitoring, biomarker discovery in Parkinson's disease and MS, promises and challenges of application of AI in healthcare, and emerging therapeutic approaches, including stem cell therapies, extracellular vesicles, and metabolic interventions.

Neuro-SysMed

Junior Scientist Symposium SCIENTIFIC PROGRAMS

MARCH 21, 2025

Auditorium 4, BB building
Academic responsible: Shamundeeswari Anandan
Chair: Ida Herdlevær

09.00-09.10	Welcome and Introduction
09.10-10.10	Keynote lecture by **Cecilie Nordbotten**, UIB AI-Core team: Practical use of AI in research and your daily work
10.10-10.30	*Coffee break*
10.30-10.55	**Valentina Casadei**, Care Node: Wearable Devices in the DARK.DEM Trial: Implications of Measurement Accuracy
10.55-11.20	**Kamilla Gjerland Haugland-Pruitt**, Care Node: Decoding Death and Dying
11.20-12.00	*Lunch*
12.00-12.25	**Marine Brognaux**, PD Node: Advanced glycation end products as novel potential biomarker for Parkinson's disease
12.25-12.50	**Andrea Gremes**, PD Node: Elucidating the neuroprotective effects of NAD replenishment therapy in a mouse model: preliminary behavioral observations and further investigations
12.50-13.00	Concluding remarks

MAY 23, 2025

Conference room, BB-Building
Academic responsible: Shamundeeswari Anandan
Chair: Sepideh Mostafavi

09.00-09.10	Welcome and introduction
09.10-10.10	Keynote lecture by **Frank Riemer**, Neuro-SysMed: Incomplete Data and Artefacts - Understanding the Human behind the Images
10.10-10.30	*Coffee break*
10.30-11.00	**Zoya Sabir** and **Annelise Elde**, Care Node: Nutrition and hydration in chronic complex conditions
11.00-12.00	*Lunch*
12.00-12.25	**Marta Kaminska**, Department of Clinical Science: Causative link between periodontitis and Alzheimer's disease
12.25-12.50	**Lydia Dawn Boyle**, Care Node: Digital phenotyping using sensing technologies for people with dementia: activity and behavioral monitoring
12.50-13.00	Concluding remarks

OCTOBER 17, 2025

Auditorium 4, BB-Building
Academic responsible: Shamundeeswari Anandan
Chair: Håkon Olsen

09.00-09.10	Welcome and introduction
09.10-10.10	Keynote lecture by **Carlos Jesus**, University of Coimbra & Center for Neuroscience and Cell Biology (SNEV-ISEV Society): Bioengineering of Extracellular Vesicles for Regenerative Medicine
10.10-10.30	*Coffee break*
10.30-10.55	**Elisabeth Claire Evjenth**, Neuro-SysMed: Ultra-rapid elimination of B cells directly after intravenous infusion of anti-CD20 therapy
10.55-11.20	**Julia Nienhuis**, PD Node: Finding a diagnostic biomarker for Parkinson's disease
11.20-12.00	*Lunch*
12.00-12.25	**Shivam Pandey**, Care Node: AI and healthcare: Promises, challenges and reality with application in healthcare
12.25-12.50	**Max Korbmacher**, MS Node: Accelerated grey matter degeneration in relapsing remitting multiple sclerosis
12.50-13.00	Concluding remarks

DECEMBER 5, 2025

Auditorium 4, BB-Building
Academic responsible: Shamundeeswari Anandan & Yola Gerking
Chairs: Håkon Olsen & Casper Eugen Sandvik

09.00-09.10	Welcome and introduction
09.10-10.10	Keynote lecture & workshop by **Ellen Hagen** and **Kristin Miskov Nodland** from the UiB Ferd career center for early-stage researchers: Beyond the Lab: Navigating Your Career with Purpose
10.10-10.30	*Coffee break*
10.30-10.55	**Andrea Kyvik Habbestad**, MS Node: EBV and MS: My PhD Project Plan
10.55-11.20	**Marie Ytterdal**, MS Node: Mesenchymal Stem Cells and Extracellular Vesicles as Therapeutic Tools in Multiple Sclerosis
11.20-12.00	*Lunch*
12.00-12.25	**Connor Langworth-Green**, PD Node: Immune Dysregulation and Innate-Adaptive Interplay Across Parkinson's Disease: From Biomarker Discovery to Targeted Immune Intervention
12.25-12.50	**Jonas Bull Haugsøen**, MS Node: Immune Remodeling after Autologous Stem Cell Transplantation in RRMS
12.50-13.00	Concluding remarks

COMPLETED DOCTORAL DEGREES

Researcher education at all levels is central for Neuro-SysMed. In 2025, we had the opportunity to celebrate five completed PhD degrees.

Romain Guillaume Bernard Charles Marie Guitton — 9 December 2025

"Studies of mtDNA epigenetics and structural integrity in health, ageing, and Parkinson's disease." Supervisors: Professor Charalampos Tzoulis; Senior Researchers Christian Dölle and Gonzalo Sanchez Nido.

Brit Ellen Rød — 19 June 2025

"Rituximab for multiple sclerosis: Safety, efficacy and mechanism of action." Supervisors: Associate Professor Stig Wergeland; Professor Øivind Torkildsen; Professor Kjell-Morten Myhr.

Simon Ulvenes Kverneng — 4 November 2025

"Exploring clinical biomarkers of mitochondrial dysfunction in Parkinson's disease." Supervisors: Professor Charalampos Tzoulis; Senior Researcher Christian Dölle; Researcher Lilah Toker.

Julia Axiina Tuominen — 3 June 2025

"Discovering disease-modifying treatments for Parkinson's disease within pharmacology and nutrition." Supervisors: Associate Professor Jannicke Igland; Dr. Kjetil Bjørnevik; Dr. Julia Romanowska; Professor Trond Riise.

Mary Dayne Sia Tai — 17 October 2025

"Protein homeostasis as a therapeutic target for dopamine deficiencies and hyperphenylalaninaemia." Supervisors: Professor Aurora Martinez; Dr. Juha Pekka Kallio; Dr. Marte Innselset Flydal.

Margareth Hagen, UiB Rector, and Simon Ulvenes Kverneng in the doctoral degree awards ceremony. Photographer: Thor Brødreskift

RESEARCH NODES

Neuro-SysMed's research activities are organized in Reseach Nodes based on disease focus or supporting research fields, with cross-node communication and collaboration.

Neuro-SysMed is organised in the following nodes:

MS — **Multiple Sclerosis (MS) Node**, led by **Professor Øivind Torkildsen and Professor Kjell-Morten Myhr**, coordinating clinical studies in MS

PD — **Parkinson's Disease (PD) Node**, led by **Professor Charalampos Tzoulis**, coordinating clinical studies in PD

ALS — **Amyotrophic Lateral Sclerosis (ALS) Node**, led by **Professor Ole-Bjørn Tysnes and Postdoc Tale Litlere Bjerknes**, coordinating clinical studies in ALS

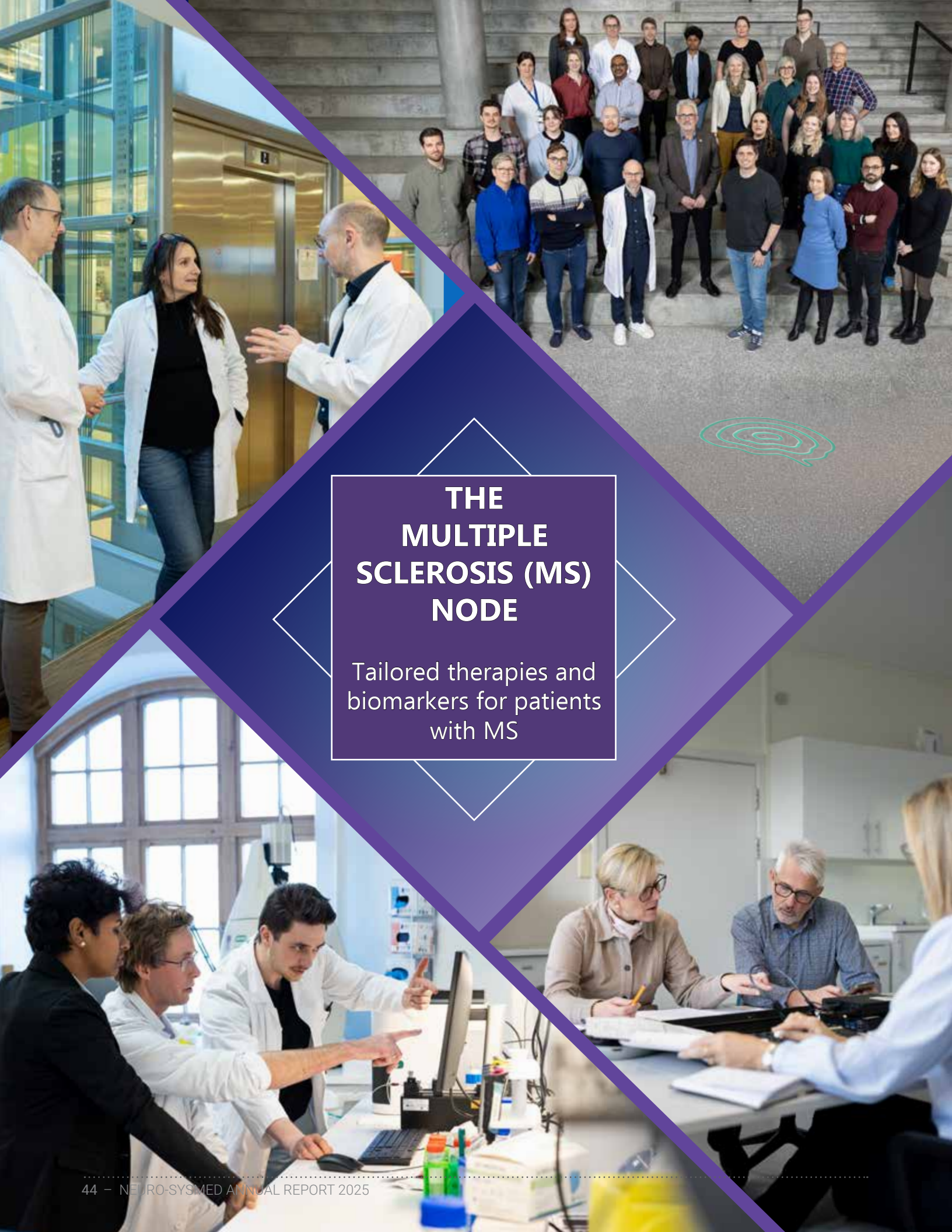
DEM — **Dementia Node**, led by Associate Professors **Kristoffer Haugarvoll and Ragnhild Eide Skogseth**, coordinating clinical studies in dementia

CARE — **Care Node**, led by **Professor Bettina Husebø**, coordinating clinical studies in care and palliation

DRUG — **Drug Discovery Node**, led by **Professors Aurora Martinez and Jannicke Igland**, coordinating drug discovery activities for novel and repurposed compounds

SBB — **Systems Biology & Bioinformatics Node**, led by **Dr. Gonzalo Sanchez Nido** and **Dr. Dimitrios Klefogiannis**, coordinating data integration, multimodal analyses and bioinformatics – an essential part of our systems medicine activity

RRI PPI — **Responsible Research and Innovation & Patient and Public Involvement (RRI/PPI) Node**, led by **Professor Jan Reinert Karlsen** and **Dr. Caroline Engen**, coordinating RRI/PPI and philosophy of neurodegeneration



THE MULTIPLE SCLEROSIS (MS) NODE

Tailored therapies and biomarkers for patients with MS

The Multiple Sclerosis (MS) Node carries out cutting-edge translational and clinical research with the dual goals of enabling early diagnosis and delivering targeted treatments, thereby improving the quality of life for individuals living with MS.

Node leaders: Kjell-Morten Myhr and Øivind Torkildsen

Kjell-Morten Myhr *is a senior consultant and professor of neurology. Myhr has led the Bergen MS Research Group at Haukeland University Hospital and the University of Bergen since 2001. In August 2025, he transitioned to his current position as Vice-Rector for Research and Innovation at the University of Bergen. He has previously chaired the Norwegian MS Competence Centre, the Norwegian MS Registry, and the first KG Jebsen Centre for Medical Research (in MS). He is currently the deputy director of Neuro-SysMed.*

Øivind Torkildsen *is a professor of neurology at the University of Bergen and senior consultant at the Department of Neurology, Haukeland University Hospital, Norway. He leads the Bergen Multiple Sclerosis Research Group and serves as coordinator of the EU-Horizon project EBV-MS. He is the principal investigator in several national and international MS studies, including OVERLORD-MS and TAF-EBV. His research focuses on disease mechanisms, biomarkers, and clinical treatment strategies in multiple sclerosis, with particular emphasis on B-cell-directed therapies and Epstein-Barr virus-related pathogenesis.*

The MS Research Group (MS Node) has longstanding and internationally recognized research expertise ranging from basic immunopathological characterisation and preclinical animal studies to epidemiology, clinical course, imaging, clinical trials, health economics, and patient-reported outcome measures. Under the leadership of Professor Myhr, the Group has focused on four research areas: Clinical Neurology and Biomarker Research (coordinated by Professor Myhr), Clinical Treatment Trials (coordinated by Professor Ø. Torkildsen), Epidemiology and Registry-Based Research (coordinated by Associate Professor S. Wergeland), and Pathology and Animal Models (coordinated by Professor L. Bø and Dr. C. Kvistad). The strong interdisciplinary research strategy has been sustained and has led to more than 40 PhD theses with significant contributions in clinical neurology, nursing, physiotherapy, epidemiology, social sciences, psychiatry, basic immunology, imaging, and proteomics. The group has initiated or participated in more than 50 clinical treatment trials and contributed to more than 550 scientific papers on various topics within multiple sclerosis. As of August 2025, the group is led by Professor Torkildsen.

Research Focus

The MS Node is currently addressing key challenges in MS therapy. Their primary focus is on optimizing treatment for relapsing-remitting MS by employing early, high-efficacy disease-modifying therapies and stem cell therapy for patients who experience breakthrough disease activity. They also concentrate on the neurodegenerative component of progressive MS, and on the symptomatic management of pain, spasticity and sleep disturbances. More recently, they have begun exploring novel antiviral treatment targets aimed at both treating and preventing the disease.

The group was recently evaluated by the Research Council of Norway (RCN), and received the following description:

"The Bergen Multiple Sclerosis (MS) Research Group provides an outstanding environment for supporting the production of world-leading research which is comparable to the best work internationally in this area."

The clinical impact case presented by the group received the following evaluation:

"This is an incredible story of clearly planned clinical research with an eye on improving patient outcomes and balancing this with a societal impact, as the licenced therapy is so expensive. Their approach has all the merits of good research governance, of national and international collaboration, and this is a fantastic example of clinical innovation that helps patients and society."

Node Activities

The MS Node has extensive experience in diagnosing and treating MS. Their ongoing research aims to define the significance of potential risk factors and

biomarkers for prognosis and treatment response, with the goal of optimizing treatment strategies across different disease stages. Overall, the node aims to develop tailored treatment strategies for individuals with MS. Major challenges include maximizing the effectiveness of existing disease-modifying therapies and identifying new disease pathways that can be targeted by novel treatments, which is especially crucial for addressing the neurodegenerative component in progressive MS. In addition, they are developing new strategies for disease prevention. Currently, the MS Node is conducting 13 investigator-initiated and five industry-sponsored clinical trials.

Investigator-sponsored clinical trials:

- **The RAM-MS study** evaluates the safety and efficacy of autologous hematopoietic stem cell transplantation compared to high-efficacy disease-modifying therapies in relapsing-remitting MS patients.
- **The OVERLORD-MS study** is a non-inferiority study evaluating and comparing the efficacy and safety of rituximab (500 mg) and ocrelizumab (600 mg) in newly diagnosed relapsing remitting MS patients.
- **The ocrelizumab-to-rituximab switch study** is an observational study evaluating the efficacy and safety of switching therapy from ocrelizumab (600 mg) to rituximab (500 mg) after 30 months of therapy. This is an extension of the OVERLORD-MS study.
- **REDUCE-MS** is an observational study investigating extended dosing intervals of rituximab therapy. Patients who have been stable on standard 6-month dosing intervals of rituximab for 36 months (during the OVERLORD-MS study) will extend the dosing interval to 12 months for a further 24 months.
- **The SMART-MS study** is a placebo-controlled, crossover pilot study evaluating regenerative effects from mesenchymal autologous stem cells in patients with progressive MS.
- **NORSEMAN-MS** is a placebo-controlled add of nicotinamide riboside (NR) to standard care in progressive multiple sclerosis, evaluating effects on disability progression defined by the Expanded Disability Status Score (EDSS), the Nine-Hole-Peg test (9-HPT) or Timed 25 Foot Walking (T25FW).
- **The rituximab versus cladribine study** is a prospective registry-based observational study comparing the efficacy of these therapies among de novo patients and those who switch from previous therapies due to treatment failure or side effects.
- **TAF-MS 0** is a six-month observational study to evaluate Epstein-Barr virus (EBV) shedding in the saliva of patients receiving natalizumab, rituximab or cladribine for relapsing-remitting MS.
- **TAF-MS 1** is a placebo-controlled add-on proof-of-concept study evaluating the safety and efficacy of tenofovir alafenamide fumarate (TAF) 25 mg or placebo to standard natalizumab infusion therapy for six months of therapy.
- **TAF-DELTA** is a phase IIa dose-escalation trial designed to evaluate the safety and biological effects of increasing doses of tenofovir alafenamide on Epstein–Barr virus activity in healthy EBV-seropositive individuals.
- **TARGET-EBV MS** is a multicentre, randomised, double-blind phase IIb clinical trial investigating whether antiviral treatment targeting Epstein–Barr virus (EBV) can reduce neuronal damage in multiple sclerosis.
- **A digital therapeutic to improve Insomnia in multiple sclerosis** is a randomised controlled trial to evaluate the efficacy and safety of cognitive behavioural therapy for insomnia in patients with multiple sclerosis.
- **The 3TR – Taxonomy, Treatment, Target and Remission – study** is an international EU-funded observational study to define treatment response biomarkers for different immune-mediated diseases.

Industry-sponsored clinical trials:

- A Rollover Study to Evaluate the Long-Term Safety and Efficacy of Ocrelizumab in Patients with Multiple Sclerosis (OLERO). Sponsor: Roche.
- A Study to Investigate Long-term Safety and Tolerability of Tolebrutinib in Participants with Multiple Sclerosis. Sponsor: Sanofi.
- Primary Progressive Multiple Sclerosis (PPMS) Study of Bruton's Tyrosine Kinase (BTK) Inhibitor Tolebrutinib (SAR442168) (PERSEUS). Sponsor: Sanofi.
- Non-relapsing Secondary Progressive Multiple Sclerosis (NRSPMS) Study of Bruton's Tyrosine Kinase (BTK) Inhibitor Tolebrutinib (SAR442168) (HERCULES). Sponsor: Sanofi.
- LEMTRADA-PASS Study: A prospective, multicentre, observational, post-authorisation safety study to evaluate the long-term safety profile of LEMTRADA® (alemtuzumab) treatment in patients with relapsing forms of multiple sclerosis. Sponsor: Sanofi.

Biomarker Studies

The MS Node is currently involved in immune phenotyping cells from patients included in ongoing clinical trials to identify biomarkers for treatment response. The goal is to define disease remission to tailor dosing, treatment duration, and patient selection for different therapies.

Additionally, they are studying the potential of extracellular vesicles as biomarkers for disease activity and response to B-cell depletion therapy in relapsing-remitting MS.

The node also conducts preclinical cell culture- and animal studies to evaluate possible disease pathways of progressive MS and the regenerative potential of stem cell therapy, as well as the role of microglia in these disease processes.

Treatment responses are further assessed using neurofilament biomarkers in both cerebrospinal fluid and serum. In collaboration with the Mohn Medical Imaging and Visualization Centre at Haukeland University Hospital, they evaluate treatment responses using magnetic resonance imaging (MRI).

MS-registry studies

The MS-registry part of the MS Node is conducting long-term safety studies of MS therapies and analysing real-world data on treatment compliance and factors influencing discontinuation rates for ongoing therapies. They are also evaluating the benefit of early high-efficacy treatment compared to an escalation treatment strategy.

Selected publications from 2025:

1. **Rød BE, Høgestøl EA, Torkildsen Ø, Bjørnevik K, Gran JM, Øverås MH, König M, Myhr KM, Wergeland S, Nygaard GO**. Comparative effectiveness of rituximab and cladribine in relapsing-remitting multiple sclerosis: A target trial emulation. *Mult Scler* 2025;31(8):975-984. doi: 10.1177/13524585251342727. PMID: 40415655.

2. **Norborg H, Aarseth JH, Mannseth J, Henriksen HN, Grytten N, Myhr KM, Wergeland S**. Effect of early highly effective treatment compared to an escalating treatment strategy in multiple sclerosis. *Mult Scler Relat Disord* 2025;103:106702. doi: 10.1016/j.msard.2025.106702. PMID: 40886413.

3. **Schoof LG, Rød BE, El Mahdaoui S, Michelsen JS, Høgestøl EA, Myhr KM, Rise HH, Su Z, Eriksson F, Friede T, Lundell H, Sellebjerg F, Sidaros K, Siebner HR, Wiggermann V, Jasperse B, Lissenberg-Witte B, van Oosten BW, Schoonheim MM, Edan G, Gaubert M, Le Page E, Kerbrat A, Michel L, Strijbis EMM, Torkildsen Ø, Christensen JR**. Non-inferiority of Rituximab versus OCrelizumab in Multiple Sclerosis (ROC-MS)-an individual participant data meta-analysis. *Mult Scler Relat Disord* 2026 Jan;105:106858. doi: 10.1016/j.msard.2025.106858. PMID: 41317517.

4. **Kapali A, Daltveit AK, Myhr KM, Bjornevik K, Eid K, Bjørk MH, Brantsæter AL, Riise T, Cortese M.** Vitamin D intake and multiple sclerosis risk in the Norwegian Mother, Father and Child cohort. *J Neurol Neurosurg Psychiatry* 2025:jnnp-2025-337300. doi: 10.1136/jnnp-2025-337300. PMID: 41314793.

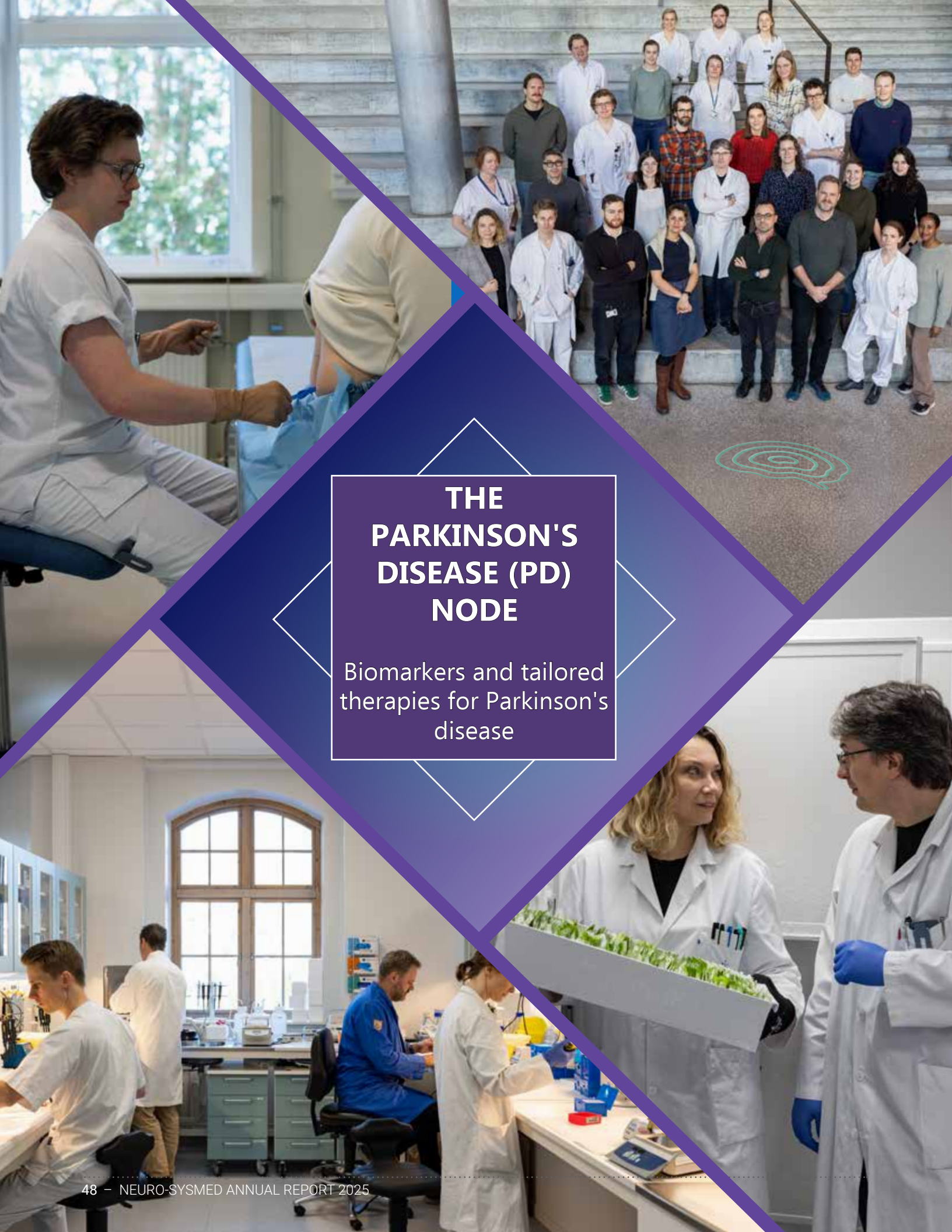
5. **Torkildsen Ø, Bru ANS, Behzadi GIN, Myhr KM**. Successful Treatment of Progressive Multifocal Leukoencephalopathy With Tenofovir Alafenamide Fumarate. *Neurol Neuroimmunol Neuroinflamm* 2026;13(1):e200522. doi: 10.1212/NXI.0000000000200522. PMID: 41289545.

6. **Cortese M, Peng X, Edan G, Freedman MS, Hartung HP, Montalban X, Sandbrink R, Radü EW, Barkhof F, Wicklein EM, Kappos L, Ascherio A, Bjornevik K; BENEFIT Study Group (Myhr KM).** Serum Alpha-Linolenic Acid and Long-Term Multiple Sclerosis Activity and Progression. *Neurology* 2025;105(3):e213905. doi: 10.1212/WNL.0000000000213905. PMID: 40674673.

7. **Serkland TT, Skrede S, Hallin EI, Myhr KM, Torkildsen Ø, Röblitz S.** Pharmacokinetic-pharmacodynamic modelling in a clinical pilot study of rituximab in multiple sclerosis: Towards personalized dosing interval. *Br J Clin Pharmacol*. 2025;91(10):2988-2997. doi: 10.1002/bcp.70136. PMID: 40515509.

8. **Fox RJ, Bar-Or A, Traboulsee A, Oreja-Guevara C, Giovannoni G, Vermersch P, Syed S, Li Y, Vargas WS, Turner TJ, Wallstroem E, Reich DS; HERCULES Trial Group (Torkildsen Ø).** Tolebrutinib in Nonrelapsing Secondary Progressive Multiple Sclerosis. *N Engl J Med* 2025;392(19):1883-1892. doi: 10.1056/NEJMoa2415988. PMID: 40202696.

9. **Fossum MT, Torgauten HM, Aarseth JH, Shirzadi M, Wergeland S, Myhr KM, Bø L, Torkildsen Ø, Wesnes K.** Early extended interval dosing of rituximab in multiple sclerosis: A comparative cohort study on efficacy and safety. *Mult Scler Relat Disord* 2025;97:106400. doi: 10.1016/j.msard.2025.106400. PMID: 40157038.



THE PARKINSON'S DISEASE (PD) NODE

Biomarkers and tailored therapies for Parkinson's disease

The Parkinson's Disease Node conducts cutting-edge translational and clinical research with the aim to improve the diagnosis, treatment, and quality of life of individuals with Parkinson's Disease (PD) and other neurodegenerative parkinsonisms, including dementia with Lewy bodies (DLB), progressive supranuclear palsy (PSP), multiple system atrophy (MSA), and corticobasal syndrome (CBS). With innovative initiatives, the PD node also addresses critical gaps in the neurodegeneration field, aiming to move the standard approach from late treatment to prodromal intervention and proactive prevention.

Node leader: Charalampos Tzoulis

***Charalampos Tzoulis**, MD, PhD, is an internationally recognized expert in movement disorders and neurodegeneration who holds the position of professor of neurology and neurogenetics at the University of Bergen and Haukeland University Hospital, Bergen, Norway. He is Director of the Neuro-SysMed Centre, and the K.G. Jebsen Centre for Translational Research in Parkinson's disease. He is also Director for the newly established Mohn Center for Neuroprotection and ICoN: Innovation Center for Neuroresilience, a center for research-driven innovation (SFI). Professor Tzoulis leads the research group DECODE-PD.*

The PD Node is globally acknowledged for implementing full-cycle translation – from the laboratory to the bedside and back – and is now being recognized for groundbreaking and ambitious strategies to develop and test PD therapies. These include two multi-arm multi-stage platform trials, the establishment of the first Norwegian cohort of individuals in prodromal stages of neurodegenerative diseases, and a growing focus towards prevention (all detailed below). The Node's work has constituted the foundation for multiple clinical trials across neurodegenerative diseases at the Centre and across the globe. Moreover, the PD Node's strong credibility has attracted growing interest from organizations and companies worldwide, which are establishing clinical trial collaborations through funding and scientific contributions

Node activities

Basic and translational research at the PD Node has nominated mitochondrial function, redox biology, and other metabolic processes as promising therapeutic targets primarily for PD and, by extension, other neurodegenerative and neuroinflammatory disorders, including Alzheimer's disease, ALS, and MS. Inspired by these findings, the PD Node conducts multiple clinical trials of NAD-replenishment therapy, with a broad range of objectives ranging from establishing safety and pharmacokinetic profiles, to determining the optimal biological dose for brain diseases, and testing efficacy in delaying or preventing PD and other parkinsonisms. This research has inspired and triggered several other NAD-replenishment trials at the Centre, targeting Alzheimer's disease, ALS, and MS (see respective sections).

In addition, the PD Node is advancing a novel therapeutic strategy in Parkinson's disease using ***D-serine***, the right-handed optical isomer of the amino acid serine. Based on pioneering work by our collaborator Professor David Sulzer (Stanford University), demonstrating that D-serine can promote axonal/synaptic sprouting and functional reinnervation in PD models, the PD Node has initiated the D-SPARK clinical study in collaboration with Professor Sulzer and SPARK-NS, a US-based non-profit translational research organisation.

In addition, the PD Node is working actively on setting the foundations for individualised medicine in PD by running an international initiative aiming to stratify PD according to underlying molecular mechanisms and develop biomarkers for patient selection for tailored therapies. Notably, in 2025, they published results working toward *in vivo* biomarkers for stratification. To enable tailored treatment, they run world-class translational research aiming to identify novel therapeutic targets and candidate therapies for PD and emerging subtypes thereof.

Furthermore, the PD Node leads and is currently establishing a multi-arm multi-stage (MAMS) platform trial for PD – one of five initiatives in the world – as well as the first ever global trial accelerator and derisking platform designed to assess target penetration and engagement of promising treatments for PD.

During 2025, the PD Node made key advances in its clinical research projects, which include ten clinical trials and two prospective cohort studies:

- **The N-DOSE study** is a Phase IIa randomised, double-blinded dose-optimisation trial of NR in PD. The primary objective is to determine the optimal biological dose of NR for PD and other brain diseases. The study was completed in 2025.

- **The NADbrain study** is a Phase I pharmacokinetic study, aiming to assess the blood and brain NAD-kinetics following the consumption of different NAD-precursors. Based on the results of NADbrain, the optimal dosing frequency of NAD replenishment therapy will be determined. The study was accepted for publication in 2025 and published early 2026.

- **The NOPARK study** is a Phase III randomised, double-blind, multicentre clinical trial, with the primary objective to assess the efficacy of NR as a neuroprotective therapy, delaying the rate of neurodegeneration and clinical disease progression in PD. The study was completed in 2025, and results are expected to be published mid-2026.

- **The NO-PARK extension study** is an open-label, multicentre clinical trial, with the primary objective of assessing the long-term safety of NR therapy in PD. The study was completed in 2025.

- **The NADAPT study** is a Phase IIb randomised, double-blind, multicentre trial, aiming to assess the efficacy of NR as a neuroprotective, disease-modifying therapy for atypical parkinsonism, including progressive supranuclear palsy (PSP), multiple system atrophy (MSA), and corticobasal syndrome (CBS).

- **SLEIPNIR** is the world's first clinical trial accelerator and derisking platform for PD. It is a multiarm platform designed to assess whether promising disease-modifying therapies engage their intended targets in the human brain, to decide whether they should enter efficacy testing. In 2025, we secured funding and agreements with companies supplying the compounds to be tested and will start recruitment in 2026.

- **HYDRA** aims to revolutionise PD trials through an adaptive, multi-arm, multi-stage (MAMS) platform efficacy trial. This innovative approach simultaneously evaluates multiple potential disease-modifying treatments against a single placebo, with the flexibility to discontinue ineffective treatments and reallocate participants to more promising interventions.

- **NADream** is a randomised double-blind trial to explore the effects of NAD-augmentation therapy on human sleep physiology.

- **NOR-RBD** is a longitudinal cohort and clinical trial platform for prodromal α-synucleinopathies, identified by REM-sleep behaviour disorder (RBD).

- **NADage** is a Phase II randomised, double blinded trial of NAD-augmentation with NR in aging-related frailty.

- **The STRAT-PARK initiative** is a longitudinal population-based multicentre cohort study aiming to identify biological subtypes of PD and to develop biomarkers enabling patient stratification in clinical practice.

- **D-SPARK** is a randomized double-blind Phase IIb trial designed to assess whether oral treatment with D-Serine can modify motor and non-motor dysfunction, and influence biological markers of disease progression in PD.

Industry-sponsored clinical trial:

- **The REASON study**, led by Biogen: A Study to Evaluate the Safety, Tolerability, and Pharmacokinetics of BIIB094 in Adults With Parkinson's Disease.

Selected publications from 2025:

1. **Kverneng SU, Stige KE, Berven H, Mostafavi S, Lundervold K, Brischigliaro M, Brakedal B, Skeie GO, Flønes IH, Toker L, Fernandez-Vizarra E, Skogseth RE, Haugarvoll K, Cleuren YNT, Dölle C, Nido GS, Tzoulis C.** Mitochondrial complex I deficiency occurs in skeletal muscle of a subgroup of individuals with Parkinson's disease. *Commun Med (Lond)*. 2025 Apr 27;5(1):141. doi: 10.1038/s43856-025-00817-7. PMID: 40289204.
2. **Kverneng SU, Mostafavi S, Mikhaleva Y, Johanson GAS, Berven H, Lundervold K, Skeie GO, Sheard E, Søgnen M, Geijerstam SA, Vetås T, Brischigliaro M, Fernandez-Vizarra E, Torres Cleuren YN, Dölle C, Tzoulis C**. Platelet mitochondrial complex I and IV activities are not reliable stratification biomarkers in Parkinson's disease. *J Parkinsons Dis*. 2025 Nov;15(7):1218-1228.doi: 10.1177/1877718X251365253. Epub 2025 Aug 14. PMID: 40808415.
3. **Lillebostad PAG, Njølstad TH, Hogstad S, Riemer F, Kverneng SU, Stige KE, Biermann M, Jog M, Buch S, Haacke EM, Tzoulis C, Lundervold A.** Deep-learning segmentation of the substantia nigra from multiparametric MRI: Application to Parkinson's disease. *Imaging Neurosci (Camb)*. 2025 Sep 29;3:IMAG.a.158. doi: 10.1162/IMAG.a.158. PMID: 41035621.
4. **Dick F, Johanson GAS, Tysnes OB, Alves G, Dölle C, Tzoulis C.** Brain Proteome Profiling Reveals Common and Divergent Signatures in Parkinson's Disease, Multiple System Atrophy, and Progressive Supranuclear Palsy. *Mol Neurobiol*. 2025 Mar;62(3):2801-2816.doi: 10.1007/s12035-024-04422-y. Epub 2024 Aug 21. PMID: 39164482; PMCID: PMC11790761.
5. **Nido GS, Castelli M, Mostafavi S, Rubiolo A, Shadad O, Alves G, Tysnes OB, Flønes IH, Dölle C, Tzoulis C.** Single-nucleus transcriptomics reveals disease- and pathology-specific signatures in α-synucleinopathies. *Brain*. 2025 May 13;148(5):1588-1603. doi: 10.1093/brain/awae355. PMID: 39546628; PMCID: PMC12073976.
6. **Bjerknes TL, Rubiolo A, Shadad O, Tysnes OB, Tzoulis C.** Chromogen-based double immunohistochemical detection of mitochondrial respiratory chain deficiencies in human brain tissue. *Acta Neuropathol Commun*. 2025 Mar 20;13(1):63. doi: 10.1186/s40478-025-01980-7. PMID: 40114250.
7. **Dölle C, Tzoulis C.** NAD augmentation as a disease-modifying strategy for neurodegeneration. *Trends Endocrinol Metab*. 2025 Dec;36(12):1072-1083. doi: 10.1016/j.tem.2025.03.013. Epub 2025 Apr 25. PMID: 40287324.
8. **Berven H, Svensen M, Eikeland H, Tvedte N, Sheard EV, Af Geijerstam SA, Søgnen M, McCann A, Arnsten L, Årseth O, Skjeie V, Hjellbrekke A, Skeie GO, Cleuren YNT, Nido GS, Riemer F, Tzoulis C, Dölle C.** The NAD-brain pharmacokinetic study of NAD augmentation in blood and brain using oral precursor supplementation. IN PRESS. doi. org/10.1016/j.isci.2026.114764. *iScience*.

THE AMYOTROPHIC LATERAL SCLEROSIS (ALS) NODE

Clinical studies and stratification for ALS

The ALS Node conducts cutting-edge clinical research on ALS to improve the diagnosis, treatment options, and care of individuals with ALS.

Node leaders: Ole-Bjørn Tysnes and Tale Litlere Bjerknes

Ole-Bjørn Tysnes *is a consultant neurologist at the Department of Neurology at Haukeland University Hospital and professor of neurology at the University of Bergen. He has for many years focused his research on ALS and PD and serves as Principal Investigator for the ongoing ALS studies at Neuro-SysMed.*

Tale Litlere Bjerknes *has an MD from the Norwegian University of Science and Technology and a PhD from the Kavli Institute for Systems Neuroscience, where she studied the development of spatial representation and memory. She is a doctor in the ALS clinic at the Department of Neurology, Haukeland University Hospital, and works with clinical trials aimed at developing novel ALS therapies. Her basic research focuses on genetics and mitochondrial dysfunction in ALS. She also leads the ALS-LTMV study focusing on various aspects of quality of life in ALS patients, their partners, and children, including the impact of life-prolonging treatment with long-term mechanical ventilation.*

Node activities

Translational and clinical research from Neuro-SysMed's PD Node and other groups has nominated NAD-replenishment therapy as a potential neuro-protective intervention across neurodegenerative diseases. Moreover, one small study suggested that the combination of NR and pterostilbene (a sirtuin activator) may have added benefit in patients with ALS (PMID 30668199). Encouraged by this evidence, the ALS Node conducts clinical trials to determine whether combination therapy of NR and pterostilbene may inhibit neurodegeneration and increase survival and quality of life in patients with ALS.

The ALS Node is also highly engaged in assessing how life-prolonging interventions, such as mechanical ventilation, influence the quality of life of patients and their informal caregivers. To advance this work, they have initiated the ALS-LTMV study, which examines the impact of these therapies on the quality of life of patients, their spouses, and their children.

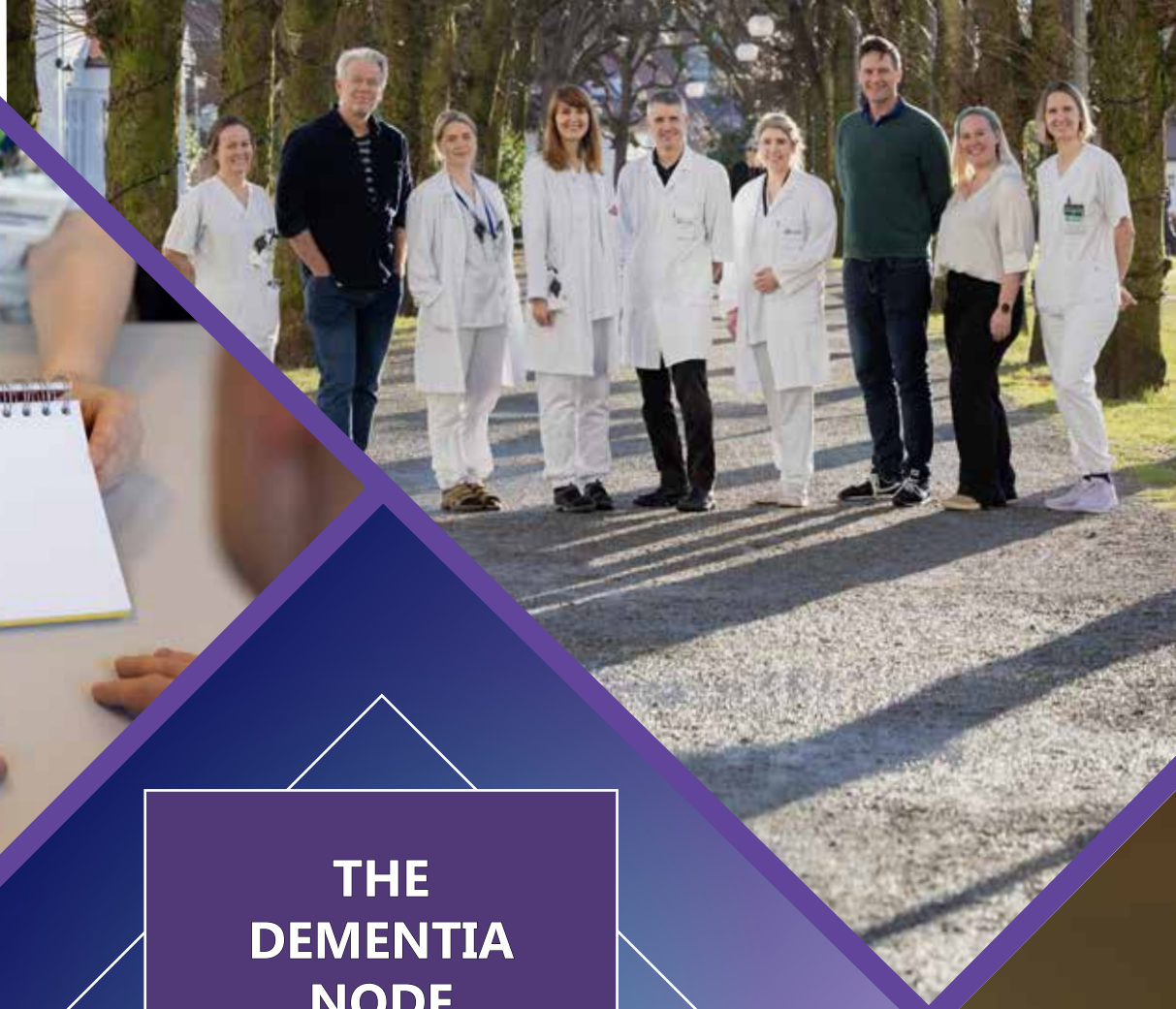
Finally, the ALS Node conducts research aiming to improve the diagnosis and tailored treatment opportunities for patients, and they are planning research for ALS clusters in Norway.

During 2025, the ALS node made substantial advances in its clinical research projects, which include five clinical trials, including one industry-sponsored trial, and one prospective cohort study:

- **The NO-ALS study** is a Phase II randomised, double-blind, multicentre clinical trial, with the primary objective to assess the efficacy of NR as a neuroprotective therapy, delaying the rate of neurodegeneration and clinical disease progression, and increasing patient survival in ALS.
- **The NO-ALS extension study** is a Phase II open-label, multicentre clinical trial, with the primary objective of assessing the long-term safety of NR therapy in ALS, actively recruiting participants who have completed the NO-ALS study.
- **The LTMV study** aims to study the effects of long-term ventilation support in ALS participants on the quality of life of patients and their families.
- **STRAT-ALS**: The ALS Node is conducting a stratification study in ALS (STRAT-ALS), recording detailed clinical data and collecting biological materials, including autopsies from ALS patients and controls.
- **The CARDINALS study**: International industry multi-centre study on an anti-inflammatory drug on the progression of ALS. Finished in December 2024. Negative study.

Selected publications from 2025:

1. **Bjerknes TL, Rubiolo A, Shadad O, Tysnes OB, Tzoulis C**. Chromogen-based double immunohistochemical detection of mitochondrial respiratory chain deficiencies in human brain tissue. *Acta Neuropathol Commun*. 2025 Mar 20;13(1):63. doi: 10.1186/s40478-025-01980-7. PMID: 40114250.
2. **Novy C, Tysnes OB, Busk ØL, Jaioun K, Holmøy T, Holla ØL, Høyer H**. Association of *UNC13A* with increased amyotrophic lateral sclerosis risk, bulbar onset, and lower motor neuron involvement in a Norwegian ALS cohort. *Amyotroph Lateral Scler Frontotemporal Degener.* 2025 Aug;26(5-6):566-572.
3. **Taule T, Tysnes OB, Aßmus J, Morland AS, Renså MA, Revheim T, Glesnes S, Rekand T.J.** Early cognitive decline in amyotrophic lateral sclerosis and its relation to driving: an observational study. *Rehabil Med*. 2025 Sep 24;57:jrm43483. doi: 10.2340/jrm.v57.43483.



THE DEMENTIA NODE

Biomarkers and tailored therapies for dementia

The Dementia Node conducts clinical and translational research aiming to improve the diagnosis and treatment of people with neurodegenerative dementias, such as Alzheimer's disease (AD) and dementia with Lewy bodies (DLB). The dementia research at Neuro-SysMed depends heavily on our partners at Haraldsplass Deaconess Hospital, the University of Bergen, and Haukeland University Hospital.

Node leaders: Kristoffer Haugarvoll and Ragnhild Eide Skogseth

***Kristoffer Haugarvoll**, MD, PhD, is principal investigator (PI) in the Bergen Dementia Research Group, Associate Professor at the University of Bergen, and a consultant neurologist at the Department of Neurology, Haukeland University Hospital. Dr. Haugarvoll's clinical expertise includes neurodegeneration, movement disorders, dementia, and neurogenetics. His main research focus is dementia and neurodegeneration, in particular dementia related to Alzheimer's disease (AD), dementia with Lewy bodies (DLB), and the Parkinson's disease dementia (PDD) spectrum.*

***Ragnhild Eide Skogseth**, MD, PhD, is an associate professor at the University of Bergen and a consultant geriatrician and principal investigator (PI) for dementia studies at Haraldsplass Deaconess Hospital. Dr. Skogseth's clinical expertise includes neurodegeneration, dementia, and biomarkers. Her main research focus is dementia and neurodegeneration, in particular dementia related to Alzheimer's disease (AD) and dementia with Lewy bodies (DLB), and novel biomarkers to better diagnose these diseases.*

Node activities

Motivated by the promising finding of NAD-replenishment therapy in neurodegenerative diseases and aging, the Dementia Node has initiated clinical treatment studies to assess the neuroprotective potential of NAD-supplementation in Alzheimer's disease. In addition, they conduct state-of-the-art biomarker research aiming at identifying subtypes of individuals with dementia, including AD and DLB, and to develop clinically applicable biomarkers for stratifying the dementias according to underlying molecular patterns.

During 2025, the Dementia Node made key advances in its clinical research projects, which include one clinical trial and one prospective cohort study:

- **The N-DOSE study** is a Phase II randomised, double-blinded dose-optimisation trial of NR in AD. The primary objective is to determine the optimal biological dose of NR for AD, so that larger trials focusing on efficacy can be designed. During 2025, 80 out of 80 planned trial participants were included, and 79 completed the follow-up. The predefined endpoints are being analysed, and the primary publication from the trial will be published in 2026.
- **The STRAT-COG initiative** is a longitudinal population-based cohort study aiming at stratifying individuals with dementia, such as AD and DLB, according to underlying molecular patterns, and to develop biomarkers enabling patient stratification in clinical practice. The study is employing a comprehensive biomarker panel for dementia, combining existing biomarkers for AD pathology with biomarkers for neuronal loss and α-synuclein pathology.

The Dementia Node is also a partner in the ANeED study, a Phase II trial testing ambroxol in DLB (PI: Arvid Rongve), and in the ongoing Dementia Disease Initiation (DDI) study (PI: Tormod Fladby).

Industry-sponsored clinical trial:

- **PROGRESS-AD**: the global Phase 2 clinical trial by GSK and Alector of AL101/GSK4527226 in participants with early Alzheimer's disease (AD).

Selected publications from 2025:

1. **Boyle LD, Patrascu M, Husebo BS, Steihaug OM, Haugarvoll K, Marty B.** Use of Digital Biomarkers from Sensing Technologies to Explore the Relationship Between Daytime Activity Levels and Sleep Quality in Nursing Home Residents with Dementia: A Proof-of-Concept Study. *Sensors (Basel)*. 2025 Oct 29;25(21):6635. doi: 10.3390/s25216635.
2. **Kverneng SU, Stige KE, Berven H, Mostafavi S, Lundervold K, Brischigliaro M, Brakedal B, Skeie GO, Fløynes IH, Toker L, Fernandez-Vizarra E, Skogseth RE, Haugarvoll K, Cleuren YNT, Dölle C, Nido GS, Tzoulis C.** Mitochondrial complex I deficiency occurs in skeletal muscle of a subgroup of individuals with Parkinson's disease. *Commun Med (Lond)*. 2025 Apr 27;5(1):141. doi: 10.1038/s43856-025-00817-7.
3. **Gibson LL, Skogseth RE, Hortobagyi T, Vik-Mo AO, Ballard C, Aarsland D.** Clinical Evolution of Neuropsychiatric Symptoms in Alzheimer's Disease and Dementia With Lewy Bodies in a Post-Mortem Cohort. *Int J Geriatr Psychiatry*. 2025 May;40(5):e70084. doi: 10.1002/gps.70084.

THE CARE NODE

The Care Node focuses on improving health and end-of-life care for older adults and individuals with complex conditions, including dementia and Parkinson's disease. Their vision is to promote independent ageing with a good quality of life through research-based knowledge, innovative care solutions, and strong interdisciplinary collaboration. The Centre for Elderly and Nursing Home Medicine (SEFAS) constitutes Neuro-SysMed's Care Node.

Node leader: Bettina Husebø

***Bettina Husebø**, MD, PhD, is a professor and the head of the Centre for Elderly and Nursing Home Medicine (SEFAS), which in 2024 and 2025 expanded considerably, from originally 12 to 28 staff members as the centre was expanding its activities. Professor Husebø is a specialist in anaesthesiology, intensive care, palliative care, and nursing home medicine. Her clinical research has been focused on method development and randomised controlled intervention trials, including nursing home patients and home-dwelling people with dementia, highlighting the assessment and treatment of pain, neuropsychiatric and behavioural disturbances, medication reviews, and end-of-life care. Her recent work involves a transdisciplinary approach to technology, smart living, and artificial intelligence in healthy older adults and people with complex conditions, such as dementia and Parkinson's disease.*

Node activities

The Care Node works to discover, validate, and translate novel approaches to improve our understanding of good ageing and to support our society in developing high-quality treatment and care. They strive to facilitate healthy and independent ageing for older adults, and to support informal (relatives) and formal (healthcare professionals) caregivers. Their work investigates innovative methods of symptom assessment, non-pharmacological interventions, service provision, and living environments. This includes innovative use of sensing technology that encompasses active and passive sensors integrated in the person's environment, and digital phenotyping, that is, the determination of a person's characteristics by their digital data, such as data from smartwatches, smart rings, and wall-mounted sensors.

Current studies

- **CC.AGE**: The Trond Mohn Research Foundation and the University of Bergen generously provided financial support in 2023 to establish the Centre for Complex Conditions and Ageing (CC.AGE). Here, they investigate the use of novel technology and high-quality care to improve the lives of older persons with complex conditions living at home.
- **The 5-D project**, Decoding Death and Dying in people with Dementia by Digital thanotyping (5-D) is a unique project supported by the European Research Council (ERC), investigating how sensing technology can be used to recognise symptoms among people with dementia at the end of life. By collecting data from nursing home residents, the project will develop methods and tools that can provide a more precise understanding of pain and symptoms at the end of life. 5-D includes the complementary sub-studies **DIPH.DEM**, mapping the changes in the activity of people with dementia at the end of life, and **ORAL.DEM**, evaluating the oral health status of people with dementia at the end of life and identifying the best measures to enhance oral care.
- **DARK.DEM** is a randomised controlled trial to test whether virtual darkness can alleviate agitation in people with dementia. It is funded by the Research Council of Norway (RCN) and the University of Bergen (UiB) and aims to enhance diagnostics and treatment of behavioural and psychological symptoms of dementia in specialised and municipal dementia care.
- **EI ROBOT,** Emotion-Intelligent Robot System for People with Impaired Cognition, is a project in collaboration with Vitalthings (NO), Mentech (NL), and SARA B.V. (NL), with funding from the European Union program Eureka Eurostars, the Norwegian Research Council, and the Netherlands Enterprise Agency. Here, the aim is to develop an emotion-intelligent robot system to enhance the well-being of persons with dementia or other intellectual disabilities residing in long-term care

institutions through personalised interactions while supporting care professionals.

- **The ActiveAgeing study** consists of two branches – the DIGI.PARK branch and the Helgetun branch. **The Helgetun branch** is exploring how living in an innovative, community-based environment can affect the lives of older adults, using a qualitative approach. Helgetun is an innovative and unique residential project that aims to foster active ageing with facilities to increase physical, mental, and social activities. The goal of the project is that the residents manage to live at home longer, with better physical and mental health. **DIGI.PARK** is an observational study based on quantitative research, exploring the use of wearable sensor devices for symptom tracking in home-dwelling people with Parkinson's disease.
- **IsoRhythm**, a new project in 2025, is one of 18 experiments in the European Space Agency (ESA) and the German Aerospace Center (DLR) 100-day isolation study, SOLIS100, designed to explore how prolonged confinement affects human physiology and behaviour. The Care Node team will, by analysing circadian rhythms through movement, cardiovascular signals, temperature, and molecular markers, investigate how isolation disrupts sleep–wake patterns and psychological stability. These findings will directly inform our research on circadian disturbances in ageing and neurodegenerative diseases, providing valuable parallels between spaceflight conditions and vulnerabilities seen in dementia and Parkinson's disease.

Selected publications from 2025:

- **Boyle LD, Patrascu M, Husebo BS, Steihaug OM, Haugarvoll K, Marty B.** Use of Digital Biomarkers from Sensing Technologies to Explore the Relationship Between Daytime Activity Levels and Sleep Quality in Nursing Home Residents with Dementia: A Proof-of-Concept Study. *Sensors (Basel)*. 2025 Oct 29;25(21):6635. doi: 10.3390/s25216635.PMID: 41228858
- **Patrascu M, Berge LI, Vahia IV, Marty B, Achterberg WP, Allore H, Fletcher RR, Husebo BS.** The story of pain in people with dementia: a rationale for digital measures. *BMC Med*. 2025 Apr 17;23(1):227. doi: 10.1186/s12916-025-04057-3.PMID: 40247335 Free PMC article.
- **Berge LI, Angeles RC, Gedde MH, Fæø SE, Mannseth J, Vislapuu M, Søyland Puaschitz NG, Hillestad E, Aarsland D, Achterberg WP, Allore H, Ballard C, Li F, Selbæk G, Vahia IV, Husebo BS.** Burden and care time for dementia caregivers in the LIVE@Home.Path trial. *Alzheimers Dement*. 2025 Mar;21(3):e14622. doi: 10.1002/alz.14622. PMID: 40042468 Free PMC article. Clinical Trial.
- **Reithe H, Marty B, Torrado JC, Førsund E, Husebo BS, Erdal A, Kverneng SU, Sheard E, Tzoulis C, Patrascu M.** Cross-evaluation of wearable data for use in Parkinson's disease research: a free-living observational study on Empatica E4, Fitbit Sense, and Oura. *Biomed Eng Online*. 2025 Feb 21;24(1):22. doi: 10.1186/s12938-025-01353-0. PMID: 39985029 Free PMC article.
- **Patrascu A, Ion A, Vislapuu M, Husebo BS, Tache IA, Reithe H, Patrascu M.** Digital phenotyping from heart rate dynamics: Identification of zero-poles models with data-driven evolutionary learning. *Comput Biol Med*. 2025 Mar;186:109596. doi: 10.1016/j.compbiomed.2025.109596. Epub 2025 Dec 27.PMID: 39731924 Free article.
- **Bettina S. Husebø, Justin Haugland-Pruitt, Monica Patrascu.** Contribution to Wiley Textbook. Chapter: Ethical challenges for artificial intelligence in clinical practice and research: a case study on people with dementia. In the textbook *Neuropsychology in the Age of Digital Health: Exploration, Application, and Practical Implementation*. December 2025.

Photographer: Zoya Sabir

THE DRUG DISCOVERY NODE

The Drug Discovery Node comprises two research groups employing different methodologies towards the common goal of discovering novel or repurposed drugs targeting the four disease groups of the Centre.

Node leaders: Aurora Martinez and Jannicke Igland

Aurora Martinez *is a professorat the Department of Biomedicine, University of Bergen, and the head of the Biorecognition group. The research group investigates the molecular mechanisms underlying neurometabolic and neurological disorders, applying multidisciplinary and translational approaches. The Martinez Lab is a specialised screening site at the NOR-Openscreen and EU-Openscreen networks and has proficiency in biophysics, structural biology, drug design, cellular biology, and mouse disease models. The methodological expertise contributed to Neuro-SysMed includes target identification and characterisation, compound screening using both biophysical and cellular screens, and hit identification and expansion. In addition, they perform mechanistic validation of optimal hits and have a comprehensive knowledge of the progression from early-stage drug discovery to the identification of best leads for proof-of-concept, patenting, and the direct initiation of clinical trials for repurposed drugs. Their main focus in the centre is to develop preventive and corrective therapies for Parkinson's disease (PD) and other Parkinsonian disorders, in collaboration with Charalampos Tzoulis.*

Jannicke Igland *is an associate professor in medical statistics at the University of Bergen with long experience from registry-based epidemiology, including pharmacoepidemiology. She leads the DRONE group – Drug RepurpOsing for NEurological diseases. The DRONE group harbours world-leading expertise in registry and epidemiology research. They focus on virtual drug screening, employing the Norwegian national registries to identify candidate drugs for repurposing for neurological diseases, including Parkinson's (PD), ALS, multiple sclerosis (MS), and Alzheimer's disease (AD).*

Node activities

The activities of the Drug Discovery Node in 2025 comprised:

• **Mitochondrial function**. In collaboration with the PD Node, Aurora Martinez's group has conducted a cell-based screening campaign to identify already approved drugs that can counteract the neuronal respiratory complex I (CI) deficiency observed in a subgroup of PD patients. One of the hit compounds identified by Researcher Kunwar Jung KC is a drug with the potential to enhance mitochondrial function, and it has shown promising results in enhancing mitochondrial CI protein levels and promoting mitochondrial biogenesis in dopaminergic cell models. Mechanistic studies have shown that the drug increases CI levels, mitochondrial biogenesis, and mitochondrial respiratory capacity, suggesting a potential therapeutic in PD, notably the CI-deficient subtype (Jung-KC et al., under reivew). The project has recently received additional funding through a "Qualification" project from the Research Council of Norway (RCN; KOMMERSFORSK), which positions the team for a larger "Validation" project. They have also obtained funds from the Gerda Meyer Nyquist Legat and, recently, from the "Norges Parkinson Forskningsfond" (by Kunwar Jung KC), allowing them to advance the drug discovery efforts towards inclusion in clinical trials.

• **Tyrosine hydroxylase (TH) as a treatment target in PD and parkinsonisms**. In a recent collaboration with the labs of Angeles García-Cazorla (Hospital Sant Joan de Déu, Barcelona) and Antonella Consiglio (Bellvitge University Hospital-IDIBELL, Barcelona), the team has discovered that supplementation with the TH cofactor tetrahydrobiopterin (BH4) increases TH+ cells and DA, and improves motor outcomes in a THD mouse model, highlighting the therapeutic potential of BH4 for specific TH variants in parkinsonisms (Jung-

KC et al., 2024). Recently, the team has also identified DNAJC12 as the molecular HSP40 cochaperone that maintains TH stability and decreases its propensity to aggregate. The solved structure of the complex by Cryo-EM (Tai et al., 2025) is facilitating the discovery of stabiliser drugs of TH and the TH:DNAJC12 complex.

• **Registry-based drug screening.** Igland's group is conducting a comprehensive registry-based drug screening project, which involves screening of all prescriptions given to all Norwegians in the period 2004–2023. The prescription data (approximately 1 billion prescriptions) are linked to incident cases of PD, ALS, MS, and AD. The overall objective of the project is to evaluate whether existing drugs (molecules) can be repurposed as an effective treatment. A full screen of drugs associated with PD-risk has been completed, and in collaboration with Professor Clemens Scherzer, director of The Neurogenomics Lab at Yale University, the group is currently validating 72 promising drugs using neurons from patient stem cells carrying the SNCA triplication linked to autosomal dominant PD. In addition to identifying drugs associated with the risk of developing PD, the group has also done a screen to identify drugs associated with improved prognosis among persons with PD. The results from the prognosis-study were published in Neurology in 2025 with several promising findings. Based on results from the screening and a biological validation at Yale University, a patent application was submitted in June 2025. Julia Axiina Tuominen also defended her PhD-thesis partly based on this screening in June 2025.

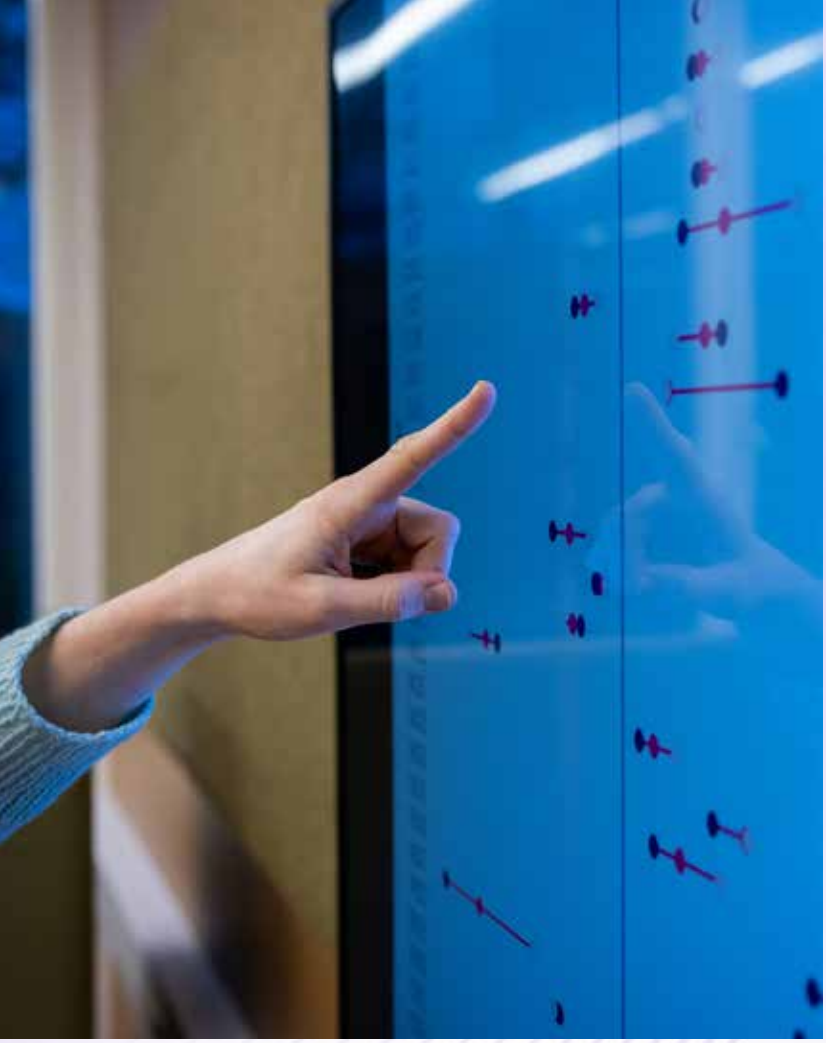
If the group succeeds in identifying drugs that can prevent or delay the development of PD, it is also important to identify a time-window for possible prevention and to identify persons with a high probability of later developing PD, who can benefit from preventive treatments. Because of this, the group has also started to use registry data to identify the start of the PD prodrome by comparing the frequency of GP-contacts and drug prescriptions between PD cases and controls in monthly intervals 10–15 years before PD-diagnosis. In collaboration with machine learning experts at the Department of Informatics, the group is also supervising three master's students in machine learning who are using various machine learning methods to develop prediction models for PD based on prescription data.

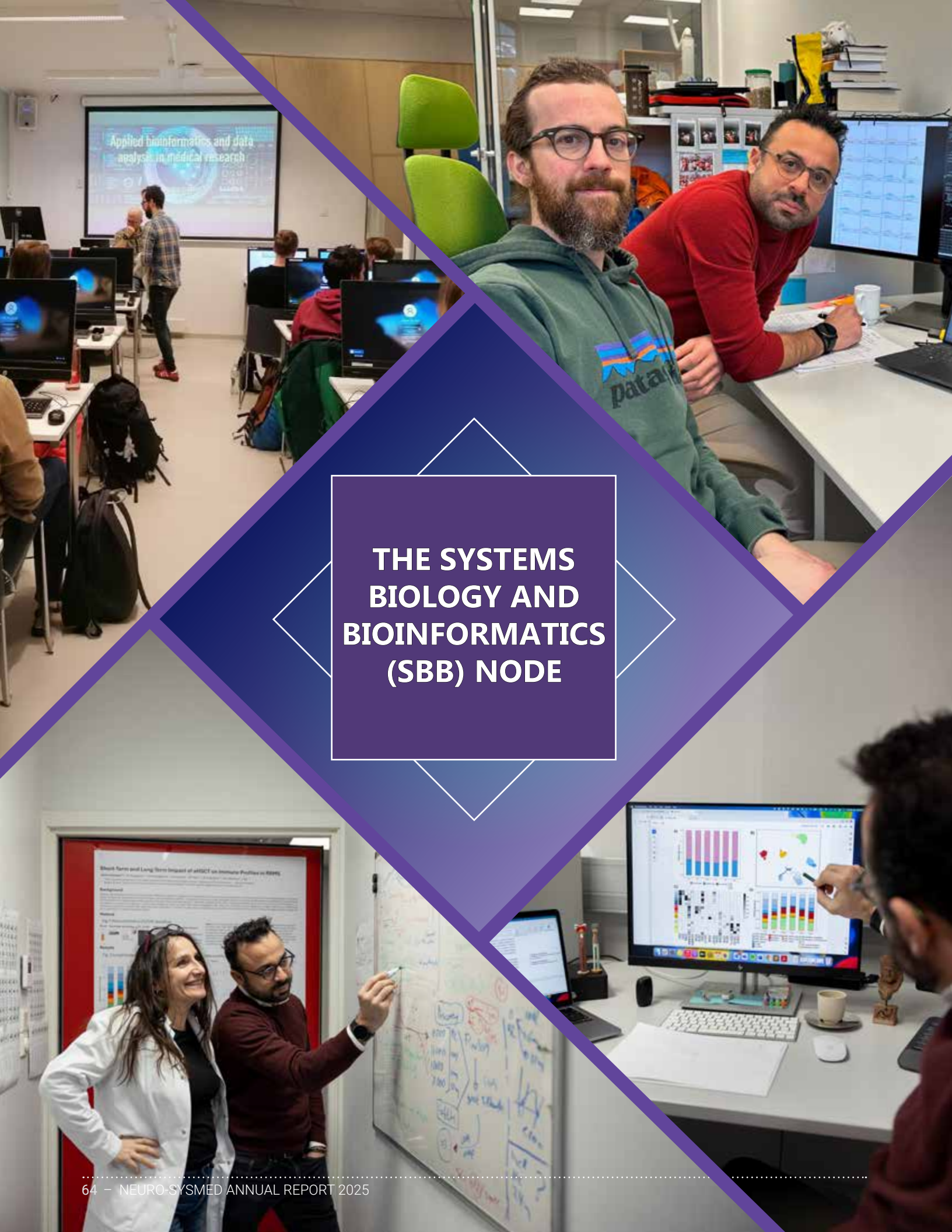
The methods used for PD have also been used for ALS, and a paper describing the ALS prodrome is currently under review and expected to be published in 2026.

In 2025, the methods have also been expanded to MS as a part of the Horizon-funded EBV-MS project. Persons with severe EBV-infections have been identified through diagnostic codes for mononucleosis in registry-data. The team is currently using prescription data and diagnostic codes from GP-contacts to describe the time period between primary EBV-infection and MS-diagnosis. They will also use prescription data for drugs used in this time-period to identify molecules associated with the risk of developing MS and with the time to MS-diagnosis. This can help understand the mechanisms for disease development and be used to identify possible new treatments.

Selected publications from 2025:

1. **Tai MDS, Ochoa L, Flydal MI, Velasco-Carneros L, Muntaner J, Santiago C, Gamiz-Arco G, Moro F, Jung-Kc K, Gil-Cantero D, Marcilla M, Kallio JP, Muga A, Valpuesta JM, Cuéllar J, Martinez A.** Structural recognition and stabilization of tyrosine hydroxylase by the J-domain protein DNAJC12. *Nat Commun*. 2025 Mar 20;16(1):2755. doi: 10.1038/s41467-025-57733-6.
2. **Fanelli G, Franke B, Fabbri C, Werme J, Erdogan I, Witte W, Poelmans G, Hyun Ruisch I, Reus LM, van Gils V, Jansen WJ, Vos SJB, Alam KA, Martinez A, Haavik J et al.** Local patterns of genetic sharing between neuropsychiatric and insulin resistance-related conditions. *Transl Psychiatry* 2025 Apr 12;15(1):145. doi: 10.1038/s41398-025-03349-9.
3. **Tuominen JA, Riise T, Romanowska J, Flores-Torres MH, Cortese M, Scherzer CR, Bjornevik K, Igland J.** Association of Medication Use and 8-Year Mortality Risk in Patients With Parkinson Disease: Drug-Wide Trial Emulation. *Neurology*. 2025 Aug 12;105(3):e213783. doi: 10.1212/WNL.0000000000213783. Epub 2025 Jul 11.
4. **Kapali A, Daltveit AK, Myhr KM, Bjornevik K, Eid K, Bjørk MH, Brantsæter AL, Riise T, Cortese M.** Vitamin D intake and multiple sclerosis risk in the Norwegian Mother, Father and Child cohort. *J Neurol Neurosurg Psychiatry*. 2025 Nov 28:jnnp-2025-337300. doi: 10.1136/jnnp-2025-337300. Epub ahead of print. PMID: 41314793.





THE SYSTEMS BIOLOGY AND BIOINFORMATICS (SBB) NODE

The Systems Biology & Bioinformatics Node is coordinating data integration, multimodal analyses, and bioinformatics – an essential part of Neuro-SysMed's systems medicine activity. The Node is highly integrated with the one-stop-shop clinical trials unit. Together, these tasks support clinical trials and biomarker discovery.

Node leaders: Gonzalo S. Nido and Dimitrios Kleftogiannis

Dr. Gonzalo S. Nido *is a senior researcher in computational biology at the University of Bergen, with more than a decade of experience in the analysis of multiomic datasets, including genomics, epigenomics, transcriptomics, and proteomics, as well as single-cell omics, and data integration. His work has made important advances, particularly in the field of PD transcriptomics.*

Dr. Dimitrios Kleftogiannis *is a senior bioinformatician at the University of Bergen. His work focuses on the development and application of computational approaches to dissect omics datasets from Next Generation Sequencing (NGS), as well as mass cytometry (CyTOF) and imaging mass cytometry (IMC) technologies. He is also interested in the application of machine learning for biomarker discoveries in multiple sclerosis.*

Systems medicine is central to the Centre's approach, enabling integrated analysis of complex neurodegenerative and neuroinflammatory diseases. By combining large multimodal datasets from clinical and translational activities with advanced analytical models, including AI, the SBB Node develops sensitive biomarker systems. These tools support earlier and more accurate diagnosis, patient stratification, and prediction of treatment response.

2025 Advances:

• **The ParkOme Initiative**: Integrates multiomics and clinicopathological data to understand Parkinson's disease (PD) and discover biomarkers and treatment targets. This involves mapping data layers (genome, epigenome, transcriptome, etc.) and using high-throughput single-cell analyses, pathology-guided single-cell transcriptomics, and Xenium spatial transcriptomics.

• **MS Single-Cell Omics**: Combines single-cell, bulk omics, and clinicopathological data to define immune mechanisms across MS subtypes. This expands immune phenotyping across CSF and blood compartments, identifying disease- and treatment-associated immune states and functional programs using advanced machine learning algorithms. High-dimensional cytometry, single-cell transcriptomics, and bulk RNA-seq are applied to patients receiving therapies such as rituximab and aHSCT, supporting patient-centric treatment strategies. The group also contributes to large-scale international initiatives, including the 3TR consortium, where the UiB has provided samples for CyTOF and bulk RNA-seq and participates in the core bioinformatics working group.

Key Milestones in 2025:

• **Single-Nucleus RNA Sequencing**: Applied to nearly 250,000 nuclei from individuals with atypical parkinsonisms (PSP and CBD), identifying novel cell-specific gene expression changes.

• **PD Stratification**: Identified two PD subtypes based on neuronal respiratory complex I deficiency, with distinct molecular and clinical profiles.

• **Transcriptome Mapping**: Mapped the full transcriptome of over 1300 brains from neurodegenerative disease patients, with a publication under current review in the *Brain* journal and a public database.

• **MS Single-Cell Analysis**: Collected and analysed more than 200 million single cells from MS participants in the SMART-MS, RAM-MS, and OVERLORD-MS clinical trials. Using advanced computational and systems biology approaches, this work characterises immune reconstitution, longitudinal cell-state transitions, and therapy-associated functional programs at single-cell resolution.

• **Funding and Platforms**: Funding was secured to investigate peripheral blood immunological signatures in MS and establish a multimodal omics analysis platform. Newly awarded grants have extended this framework to include integrated CSF and blood analyses, enabling systematic cross-compartment comparisons of immune states and functional programs relevant to disease activity and treatment response. The new 10X Xenium high-resolution spatial transcriptomics platform was acquired and will be ready to be used in 2026.

The node's data, analyses, and computational software have led to several publications in high-impact journals and presentations at major international conferences, garnering significant interest and recognition.

Selected publications from 2025:

1. **Nido GS, Castelli M et al**. Single-nucleus transcriptomics reveals disease-and pathology-specific signatures in α-synucleinopathies. *Brain* 148, 5 (2025).
2. **Kverneng SU, Stige KE et al.** Mitochondrial complex I deficiency occurs in skeletal muscle of a subgroup of individuals with Parkinson's disease. *Communications Medicine* 5, 141 (2025).
3. **S Gavasso, JB Haugsøen, D Kleftogiannis et al.** High-dimensional Immune Profiling Following Autologous Hematopoietic Stem Cell Transplantation in Relapsing-Remitting Multiple Sclerosis, *bioRxiv*, (2025), https://doi.org/10.1101/2025.07.01.662494.
4. **Anandan S, Maciak K et al.** In-Depth Characterization of L1CAM+ Extracellular Vesicles as Potential Biomarkers for Anti-CD20 Therapy Response in Relapsing–Remitting Multiple Sclerosis, *Molecular Sciences*, (2025).

THE RESPONSIBLE RESEARCH AND INNOVATION & PATIENT AND PUBLIC INVOLVEMENT (RRI/PPI) NODE

The RRI/PPI Node is developing a model of human suffering. Suffering involves conceptions of human affliction that place disease within a broader frame of burdens and the carrying capacities of patients and their caregivers. Such conceptions are crucial for the Node's ongoing work on the RRI and PPI of precision medicine (PM).

Node leaders: Jan Reinert Karlsen and Caroline Engen

Jan Reinert Karlsen *is an associate professor at the Centre for the Studies of the Sciences and the Humanities at the University of Bergen. His research includes the RRI of post-genomic medical research and conceptions of suffering across different thought traditions. He has a long track record in interdisciplinary research and teaching.*

Caroline Engen *is a postdoctoral fellow (50%) and specialist in training (psychiatry) (50%). She has previous experience from the development of personalised molecular therapy for acute myeloid leukaemia and is currently focusing on RRI of precision medicine and philosophy of suffering.*

The RRI/PPI Node is responsible for these projects/activities:

- A research project entitled "Philosophy of precision medicine in severe chronic neurological diseases (POS-PM)."
- A teaching subject called "The nature of disease and suffering and the goals of precision medicine (NEUROSYSM940)", which is part of the Neuro-SysMed research school. Initially introduced in the spring of 2023, it was also delivered in the autumn of 2024, and it is slated for its next iteration in March/April 2026.

During the Spring of 2025, Engen and Karlsen continued to work on their co-authored monograph (working title: Precision and Suffering), leading to the decision to compartmentalize the work into a monograph (written by Engen), and papers by Karlsen.

In August 2025, Engen discontinued her postdoc after having been promoted to a permanent academic position as an associate professor at the Department of Global Public Health and Primary Care, UiB. We congratulate her on her promotion! Engen will continue the project, though in a reduced capacity.

Selected dissemination activities from 2025:

1. **Schei, E., Heath, I., Dorward, P., & Engen, C. (Eds.)**. (2025). Making a Good Doctor: Sources of Strength and Wisdom (1st ed.). CRC Press. https://doi.org/10.1201/9781003593294
2. **Engen, C**. "Doctors must live": a care ethics inquiry into physicians' late modern suffering. Med Health Care and Philos 28, 275–290 (2025). https://doi.org/10.1007/s11019-025-10258-7
3. **Karlsen J.R.** "After education: Is source criticism in the age of generative AI obsolete?" 'Kildekritikkens dag', Faculty of Law, UiB, 2025-3-13
4. **Karlsen, J.R.** "Lightness and education: Reflections on generative AI and the normative assumptions and preconditions for universities", Faculty of Psychology, UiB, 2020-5-23
5. **Karlsen, J.R.** "The easy death in complex societies", 'Fagseminar i Palliasjon', Haukeland University Hospital, 2025-11-6
6. **Karlsen, J.R.** "Surface education and disciplinary depth in the age of generative AI?", Faculty of Psychology, UiB, Solstrand Hotel, 2025-11-13

CLINICAL STUDIES

Clinical studies, or trials, are the backbone of the Neuro-SysMed activities. Two overarching types of clinical trials are performed at the Centre. Interventional trials involve testing of a clinical intervention (e.g., a drug, device, or procedure), commonly in a randomised, double-blind setup. Observational trials involve following and characterising a cohort, typically to study disease progression and develop biomarkers for diagnosis and stratification. While each study has its own scientific questions and efficacy endpoints, all projects running under the Centre contribute samples and data to a common Neuro-SysMed database. This combined information is integrated to define biomarkers that enable early and precise diagnosis, subgrouping of patients within each disease, accurate prognosis, and tailored treatment choices. We currently have 37 ongoing or planned investigator-initiated clinical studies (our industry-sponsored trials are not described in this report):

MS	The RAM-MS study: a randomised clinical trial for comparing autologous hematopoietic stem cell transplantation (HSCT) versus alemtuzumab, cladribine or ocrelizumab in MS
MS	The OVERLORD-MS study: Ocrelizumab Versus Rituximab Off-Label at the Onset of Relapsing MS Disease
MS	The OR-Switch-MS study: Ocrelizumab to Rituximab Switch Study in Multiple Sclerosis.
MS	The REDUCE-MS Study: Rituximab Extended Dose Interval in Multiple Sclerosis
MS	The SMART-MS study: Study of Mesenchymal Autologous stem cells as Regenerative Treatment for Multiple Sclerosis
MS	The NORSEMAN Study: Nicotinamide Riboside Supplementation in Progressive Multiple Sclerosis
MS	The Rituximab Versus Cladribine Study
MS	The TAF-MS 0 Study: Epstein-Barr Virus Shedding in Saliva in MS-Patients Receiving Cladribine, Natalizumab or Rituximab
MS	The TAF-MS 1 Study: Tenofovir Alafenamide Fumarate (TAF) and Epstein-Barr Virus Activity in People with Multiple Sclerosis
MS	The TAF-DELTA Study: Dose Escalation of Tenofovir Alafenamide on Epstein–Barr Virus Activity in Healthy Individuals
MS	The TARGET-EBV in MS Study: Targeting Epstein–Barr Virus with Tenofovir Alafenamide in Multiple Sclerosis
MS	The NorseMS Study: A Digital Therapeutic to Improve Insomnia in Multiple Sclerosis – A Randomised Controlled Trial
MS	The 3TR Study – Taxonomy, Treatment, Target, and Remisson
PD	The N-DOSE Study: A Dose Optimisation Trial of Nicotinamide Riboside in Parkinson's Disease
PD	The NADbrain Study: A Pharmacokinetic Study of NAD Replenishment in Human Blood and Brain
PD	The NOPARK Study: A Phase III Randomised Controlled Trial of Nicotinamide Riboside in Early Parkinson's Disease

PD	The NOPARK Extension Study: An Open Label Trial of Long-Term Treatment with Nicotinamide Riboside (NR) in Parkinson's Disease
PD	The NADAPT Study: A Phase II Randomised Controlled Trial of NAD Replenishment Therapy for Atypical Parkinsonism
PD	SLEIPNIR: a Clinical Trial Accelerator and Derisking Platform for Parkinson's Disease
PD	HYDRA: An Adaptive Multiarm Multistage Clinical Trial for Parkinson's Disease
PD	NADream: A Randomised Double-blind Trial to Explore the Effects of NAD Augmentation Therapy on Sleep Physiology
PD	The NADage Study: A Randomised Double-blind Trial of NAD Replenishment Therapy on Aging
PD	NOR-RBD: A Longitudinal Cohort and Clinical Trial Platform for Prodromal α-Synucleinopathies
PD	The STRAT-PARK Study: A Prospective Multimodal Cohort Study to Stratify Parkinson's Disease and Other Parkinsonisms
PD	D-SPARK: A Randomized Double Blind Clinical Trial of D-Serine for Modifying Parkinson's Disease Progression
ALS	The NO-ALS Study: A Phase-II, Multicentre, Double-Blinded Randomised Clinical Trial of Oral NR and Pterostilbene in Early ALS
ALS	The NO-ALS Extension Study: An Open Label Study of Long-Term Therapy with NR and Pterostilbene in ALS
ALS	The ALS LTMV Study: Effects of Long-Term Ventilation Support on the Quality of Life of ALS Patients and Their Families
DEM	N-DOSE AD: A Dose Optimisation Trial of Nicotinamide Riboside in Alzheimer's Disease
DEM	The STRAT-COG Study: A Prospective Cohort Study to Stratify Dementia
CAR	CC.AGE: Complex Conditions and Ageing
CAR	Decoding Death and Dying in People with Dementia by Digital Thanotyping (5-D)
CAR	Digital Phenotyping for Changes in Activity at the End of Life in People with Dementia (DIPH.DEM)
CAR	Oral Care at the End of Life in People with Dementia (ORAL.DEM)
CAR	The ActiveAgeing Study – the Helgetun Branch
CAR	The ActiveAgeing Study – the DIGI.PARK Branch
CAR	Virtual Darkness and Digital Phenotyping in Specialised and Municipal Dementia Care (DARK.DEM)

The RAM-MS Study: A Randomised Clinical Trial for Comparing Autologous Hematopoietic Stem Cell Transplantation (HSCT) Versus Alemtuzumab, Cladribine or Ocrelizumab in MS

Disease: Multiple sclerosis
Type of study: Interventional trial



Coordinating Investigators:
Øivind Torkildsen & Anne Kristine Lehmann.
Study Director: Lars Bø

Background: Autologous hematopoietic stem cell transplantation (HSCT) is a promising therapy in MS, but data from randomised clinical trials (RCTs) are limited. Haukeland University Hospital (HUH) is the national centre for such MS therapy in Norway, and is currently conducting a multicentre, international randomised clinical trial to evaluate the efficacy and safety of autologous HSCT compared to standard high-efficacy therapies in MS. The trial is coordinated by HUH in close collaboration with centres in all Norwegian health regions, plus study sites in Sweden (Uppsala and Gothenburg), Denmark (Copenhagen), and the Netherlands (Amsterdam).

The objectives are to investigate the efficacy and safety of HSCT in highly active multiple sclerosis compared to standard high-efficacy therapies, and to establish sufficient evidence to support routine use of HSCT in MS.

Design: This is a randomised controlled open-label trial comparing the efficacy and safety of HSCT (n=50) compared to standard high-efficacy therapies (n=50) in highly active multiple sclerosis with breakthrough disease activity.

The primary endpoint of the study is the difference in the proportion of patients with no evidence of clinical or MRI disease activity (NEDA) after 2 years (96 weeks) in the main study, and further after 5 years (240 weeks) in the extension study.

Status: Recruitment was finalised in 2024, and 96 patients were included in the study. Results of the two-year follow-up are expected in Q3/Q4 2026. In Norway, patients from all health regions have been screened at the University Hospital of North Norway (Tromsø), St. Olav's Hospital (Trondheim), Akershus University Hospital (Lørenskog), and Haukeland University Hospital (HUH, Bergen). Norwegian patients randomised for HSCT were treated at HUH, and those for standard high-efficacy MS-therapy were treated at their local hospitals. Blood sampling, imaging, and clinical scoring of the Norwegian patients were performed at HUH.

Participating centres

Norway
- Haukeland University Hospital, Bergen
- Akershus University Hospital, Lørenskog
- St. Olav's University Hospital, Trondheim
- University Hospital of North Norway, Tromsø

Sweden
- Sahlgrenska University Hospital, Gothenburg
- Uppsala University Hospital, Uppsala

Denmark
- Copenhagen University Hospital, Rigshospitalet

The Netherlands
- Amsterdam UMC, Amsterdam

Funding
- KLINBEFORSK
- The Regional Health Authority of Western Norway
- Haukeland University Hospital
- The University of Bergen
- Participating hospitals
- The Research Council of Norway, Neuro-SysMed
- The Norwegian MS Society

The OVERLORD-MS Study: Ocrelizumab Versus Rituximab Off-Label at the Onset of Relapsing MS Disease

Disease: Multiple sclerosis
Type of study: Interventional trial


Coordinating Investigator: Øivind Torkildsen
Study Director: Kjell-Morten Myhr

Background: B-cell depletion therapies (rituximab, ocrelizumab, ofatumumab) are proven highly effective in MS. A Norwegian health technology assessment (HTA) indicates similar treatment effects from rituximab and ocrelizumab, but clearly states that more data, preferably from a randomised double-blinded clinical trial, are needed.

Rituximab has been used for the treatment of rheumatological diseases and haematological cancers since 1998, and due to patent expiration, it costs only a fraction of ocrelizumab. If rituximab proves to have similar effects as ocrelizumab, it may therefore reduce the annual cost for MS therapy by several hundred million NOK in Norway alone and give MS patients access to highly effective treatment at an earlier time point. In this study, the aim is therefore to compare the efficacy and safety of rituximab to ocrelizumab for the treatment of newly diagnosed treatment-naïve patients with relapsing-remitting MS (RRMS).

The objective is to evaluate whether rituximab has comparable efficacy and safety to ocrelizumab in the treatment of newly diagnosed RRMS patients.

Design: This is a randomised, double-blinded, controlled non-inferiority trial comparing the efficacy and safety of rituximab to ocrelizumab (3:2) in newly diagnosed RRMS.

The primary endpoint of the study is the proportion of patients free of new T2 magnetic resonance imaging (MRI) lesions between month 6 (re-baseline examination) and month 24 (two years).

Status: The first patient was recruited at Haukeland University Hospital in early November 2020, and the study was fully included by November 2022, with 214 patients participating. Altogether, 12 hospitals in Norway and Sweden have recruited patients in the study and are participating in the follow-up. The follow-up was finalized in 2025, and the study results were presented at the annual Neuro-SysMed Symposium in November 2025. The research paper was submitted in January 2026.

Participating centres

Norway
- Haukeland University Hospital, Bergen
- Oslo University Hospital, Oslo
- Akershus University Hospital, Lørenskog
- Stavanger University Hospital, Stavanger
- University Hospital of North Norway, Tromsø
- Nordland Hospital Trust, Bodø
- Namsos Hospital Trust, Namsos
- Molde Hospital Trust, Molde
- Sørlandet Hospital Trust, Kristiansand
- Telemark Hospital Trust, Skien
- Vestre Viken Hospital Trust, Drammen

Sweden
- Karolinska Institute, Stockholm

Funding
- KLINBEFORSK
- The Regional Health Authority of Western Norway
- The Research Council of Norway, Neuro-SysMed
- Haukeland University Hospital
- The University of Bergen
- Participating hospitals

The OR-Switch-MS Study: Ocrelizumab to Rituximab Switch Study in Multiple Sclerosis

Disease: Multiple sclerosis
Type of study: Interventional trial

Coordinating Investigator: Øivind Torkildsen
Study Director: Kjell-Morten Myhr

Background: B-cell depletion therapies are proven highly effective in MS. Real-world data indicate similar efficacy and safety of rituximab compared to ocrelizumab. Currently, several ongoing non-inferiority trials are comparing the two compounds, including the Norwegian OVERLORD-MS study.

According to the OVERLORD-MS study protocol, all patients will be offered routine treatment with rituximab after finishing 30 months of blinded therapy with ocrelizumab or rituximab. Because of limited data available describing the efficacy and safety of a switch from ocrelizumab to rituximab, we will perform a blinded six-month observation of starting on rituximab after finishing the 30-month study period with ocrelizumab or rituximab in the OVERLORD-MS study.

The objective is to evaluate the efficacy and safety of switching therapy from ocrelizumab to rituximab.

Design: This is a blinded observational study evaluating the efficacy and safety of switching therapy from ocrelizumab to rituximab.

The primary endpoint of the study is the proportion of patients free of clinical disease during the following 6 months after switching from ocrelizumab to rituximab (n=85) compared to those who continue with rituximab therapy as received during the OVERLORD-MS study (n=129).

Status: All participants in the OVERLORD-MS study who consented to participation are consecutively included when finishing the pre-planned 30-month study period of OVERLORD-MS. The last patient was included in June 2025 and was followed for another six months to December 2025. The study is expected to be finalized in Q2/Q3 2026.

Participating centres

Norway
- Haukeland University Hospital, Bergen
- Oslo University Hospital, Oslo
- Akershus University Hospital, Lørenskog
- Stavanger University Hospital, Stavanger
- University Hospital of North Norway, Tromsø
- Nordland Hospital Trust, Bodø
- Namsos Hospital Trust, Namsos
- Molde Hospital Trust, Molde
- Sørlandet Hospital Trust, Kristiansand
- Telemark Hospital Trust, Skien
- Vestre Viken Hospital Trust, Drammen

Sweden
- Karolinska Institute, Stockholm

Funding

- KLINBEFORSK
- The Regional Health Authority of Western Norway
- The Research Council of Norway, Neuro-SysMed
- Haukeland University Hospital
- The University of Bergen
- Participating hospitals

The REDUCE-MS Study: Rituximab Extended Dose Interval in Multiple Sclerosis

Disease: Multiple sclerosis
Type of study: Interventional trial


Coordinating Investigator: Øivind Torkildsen
Study Director: Kjell-Morten Myhr

Background: B-cell depletion therapy is highly effective in relapsing-remitting MS. Rituximab seems to have a comparable efficacy and safety profile to ocrelizumab, but data on optimal dosing are limited and largely based on various off-label regimes. The most frequently used dosing regimen in Norway (until recently) has been a single starting dose of 1000 mg infusion, followed by 500 mg infusions every six months for an undefined time. The therapy seems safe, and limited side effects are reported, where neutropenia, lymphopenia, hypogammaglobulinemia, and infections are the most frequent adverse events. Real-world experience indicates that B-cells may be depleted for a longer period, even for at least 12–24 months, and longer dosing intervals than six months (e.g., due to intercurrent illness or pregnancy planning) seem safe. Based on these observations, clinical practice in Norway is changing to extended dosing intervals after at least two years of therapy. In this study, we aim to investigate the efficacy and safety of extending the dosing interval to 12 or 24 months in RRMS.

All patients finishing the OVERLORD-MS study who have been stable without new MRI or clinical disease activity for at least two years will be offered an extension of further rituximab (500 mg) dosing interval to 12 or 24 months.

The objectives of the study are to evaluate whether the efficacy and safety of 24-month dosing of rituximab is equal in efficacy and with a lower risk of side effects than 12-month dosing.

Design: This is a randomized, double-blind, non-inferiority study comparing the efficacy and safety of 12 versus 24 months of rituximab in relapsing-remitting MS patients.

The primary endpoint of the study is the proportion of patients with no new or expanding T2-lesions.

Status: The study is expected to start recruiting patients in Q2 2026 and will prospectively recruit patients who have finished the OVERLORD-MS study period, including the following switch period of 6 months.

Participating centres

Norway
- Haukeland University Hospital, Bergen
- Oslo University Hospital, Oslo
- Akershus University Hospital, Lørenskog
- Stavanger University Hospital, Stavanger
- University Hospital of North Norway, Tromsø
- Nordland Hospital Trust, Bodø
- Namsos Hospital Trust, Namsos
- Molde Hospital Trust, Molde
- Sørlandet Hospital Trust, Kristiansand
- Telemark Hospital Trust, Skien
- Vestre Viken Hospital Trust, Drammen

Sweden
- Karolinska Institute, Stockholm

Funding
- The Research Council of Norway, Neuro-SysMed
- The Regional Health Authority of Western Norway
- Haukeland University Hospital
- The University of Bergen
- The DAM foundation
- Participating hospitals

The SMART-MS Study: Study of Mesenchymal Autologous Stem Cells as Regenerative Treatment for Multiple Sclerosis

Disease: Multiple sclerosis
Type of study: Interventional trial


Coordinating Investigator: Christopher Elnan Kvistad
Study Director: Lars Bø

Background: There is currently no effective treatment available to promote repair of damage to the central nervous system (CNS), caused by multiple sclerosis (MS), and thereby to reverse neurological disability. Mesenchymal stem cells (MSCs) have the potential to induce neuronal repair through multiple neurodegenerative mechanisms, including remyelination, immunomodulation, and stimulation of endogenous cerebral stem cells. In this study, the group aims to investigate the regenerative potential of stem cell treatment with MSCs in MS and to increase the understanding of the underlying mechanisms of action.

The objective of this pilot project is to study whether intrathecal treatment with autologous bone marrow-derived MSCs is feasible, safe, and promotes neural repair in patients with progressive MS.

Design: This is a randomised placebo-controlled cross-over pilot trial comparing the efficacy and safety of autologous bone marrow-derived MSCs (n=9) compared to placebo (n=9) in progressive multiple sclerosis patients.

The primary endpoint of the study is the difference in the change of composite score (CEP) of three neurophysiological measures (somatosensory evoked potentials (SEP), visual evoked potentials (VEP), and motor evoked potentials (MEP) from baseline between MSC treatment versus placebo.

The study is performed as a collaboration between Haukeland University Hospital, the Tissue Engineering Group at the University of Bergen, the University Hospital in Ulm, Germany, and coordinating centres in all Norwegian health regions, including Akershus University Hospital (Lørenskog), St. Olav's Hospital (Trondheim), and the University Hospital of North Norway (Tromsø).

Status: The first patient was included at Haukeland University Hospital in August 2021, and the study inclusion was completed in 2023. The final study took place in Q1 2025, and the results were presented at ECTRIMS 2025 in Q3. A research paper has been submitted for publication.

Participating centres

Norway
- Haukeland University Hospital, Bergen
- Akershus University Hospital, Lørenskog
- St. Olav's University Hospital, Trondheim
- University Hospital of North Norway, Tromsø

Germany
- University Hospital in Ulm

The Netherlands
- Amsterdam University Medical Centre

Funding
- KLINBEFORSK
- The Regional Health Authority of Western Norway
- The Research Council of Norway, Neuro-SysMed
- Haukeland University Hospital
- The University of Bergen
- Participating hospitals
- The Norwegian MS Society
- The Red Cross

The NORSEMAN Study: Nicotinamide Riboside Supplementation in Progressive Multiple Sclerosis

Disease: Multiple sclerosis
Type of study: Interventional trial



Coordinating Investigator: Christopher Elnan Kvistad
Study Directors: Kjell-Morten Myhr
& Charalampos Tzoulis

Background: Evidence suggests that mitochondrial dysfunction occurs in the brain of patients with MS and may play a particularly important role in the neurodegenerative processes underlying the pathogenesis of progression in MS. This mitochondrial dysfunction is suggested to compromise neuronal metabolism and survival, including ATP deficiency and decreased rate of mitochondrial NADH oxidation, leading to depletion of neuronal NAD, one of the most essential molecules for bioenergetics conversion and signalling in human cells.

The objective is to study whether oral supplementation with nicotinamide riboside (NR) as an add-on to standard care reduces disability progression in MS.

Design: This is a randomised double-blinded study where 300 patients, who have experienced worsening of disability during the last two years, receive 500 mg nicotinamide riboside (NR) orally twice daily (n=150) or placebo (n=150) for 30 months. The patients attend nine visits that include clinical scorings, imaging, blood sampling, questionnaires, and patient-reported outcomes.

The primary endpoint is the proportion of patients with 6 months confirmed disability progression, either by worsening of Expanded Disability Status Scale (EDSS), Nine-Hole-Peg-Test (9-HPT), or Timed 25 Foot Walking (T25FW) after two years of therapy.

Status: The first patient was included at Haukeland University Hospital in May 2023, and by the end of 2025, about 110 patients had been included. Eleven hospitals are participating with the inclusion of patients, and yet another 7 hospitals are considering participation.

Participating centres

- Haukeland University Hospital, Bergen
- Haugesund Hospital Trust, Haugesund
- Oslo University Hospital, Oslo
- Akershus University Hospital, Lørenskog
- University Hospital of North Norway, Tromsø
- St. Olav's University Hospital, Trondheim
- Molde Hospital Trust, Molde
- Ålesund Hospital Trust, Ålesund
- Telemark Hospital Trust, Skien
- Vestre Viken Hospital Trust, Drammen
- Østfold Hospital Trust, Kalnes

Funding

- The Regional Health Authority of Western Norway
- The Research Council of Norway, Neuro-SysMed
- Haukeland University Hospital
- The University of Bergen
- Participating hospitals
- Elysium Health, New York

The Rituximab Versus Cladribine Study

Disease: Multiple sclerosis
Type of study: Observational trial



Coordinating Investigator: Brit Ellen Rød
Study Directors: Gro Owren Nygaard (OUH)
& Stig Wergeland

Background: Norwegian MS treatment guidelines recommend prompt treatment with high-efficacy therapy at the time of diagnosis. Cladribine and rituximab are among the recommended high-efficacy therapy treatment options. Cladribine has not been compared to other active therapies in clinical trials, and the extension of the pivotal placebo-controlled trial indicates the return of new clinical and MRI disease activity after standard treatment regimens during the first and second year.

Clinical experience confirms these findings, and based on this background, we aim to compare prospectively collected data from patient cohorts from the Departments of Neurology at Haukeland University Hospital (HUH) and Oslo University Hospital (OUH), who started with rituximab or cladribine therapy during 2018 and 2019. At that time point, rituximab was the preferred high-efficacy therapy at HUH for both treatment-naïve patients and for those experiencing breakthrough disease activity on other therapies. At OUH, cladribine was the preferred high-efficacy therapy for the same patient populations.

The objectives of this study are to compare the efficacy and safety of cladribine and rituximab therapy.

Design: This is a prospective observational registry study comparing the efficacy and safety of cladribine and rituximab therapy for treatment naïve RRMS patients and for those switching from other therapies.

The primary endpoint of the study is the proportion of patients who develop new MRI disease activity during up to a four-year observational period.

Status: Results from the study show that rituximab is superior compared to cladribine as evaluated by MRI and clinical disease activity. Brit Ellen Rød presented the data at the European Committee for Treatment and Research in MS (ECTRIMS) in Copenhagen, September 2024, and received the First Prize for Best Young Investigator. The article describing the results was published in The Multiple Sclerosis Journal, July 2025 (PMID 40415655).

Participating centres

- Haukeland University Hospital, Bergen
- Oslo University Hospital, Oslo

Funding

- The Research Council of Norway, Neuro-SysMed
- Haukeland University Hospital
- Oslo University Hospital
- The DAM foundation
- The Norwegian MS Society
- The Torbjørg Hauge Legacy, University of Bergen
- The University of Bergen
- The University of Oslo
- The Kjell Alme Legacy, Bergen

The TAF-MS 0 Study: Epstein-Barr Virus Shedding in Saliva in MS-Patients Receiving Cladribine, Natalizumab, or Rituximab

Disease: Multiple sclerosis
Type of study: Observational trial


Coordinating Investigator: Øivind Torkildsen
Study Director: Kjell-Morten Myhr

Background: Novel insights from our MS research group indicate that infection with the Epstein-Barr Virus (EBV) is the leading cause of MS. As an EBV infection is persistent for life, the virus could function as a trigger or driver of MS-disease activity. If results from a clinical trial could confirm that targeting EBV reduces MS-disease activity, it would result in a paradigmatic change in our understanding of MS and the management of the disease.

Antiviral therapy targeting the Epstein-Barr virus (EBV) is not available, but evidence suggests that tenofovir alafenamide (TAF) may be an attractive candidate. To further evaluate the efficacy of TAF on EBV infection, EBV shedding in saliva is suggested as a surrogate endpoint of efficacy.

The objective is to establish knowledge of the natural course of EBV shedding in saliva from patients with RRMS receiving disease-modifying therapies. This knowledge will be used to further design clinical trials targeting EBV infection in MS patients receiving those disease-modifying therapies.

Design: This is an open observational study analysing EBV shedding in saliva samples collected weekly for five weeks from RRMS patients receiving cladribine, natalizumab, or rituximab. The study is as a part of the EBV-MS Horizon Europe project.

The primary endpoint is the frequency of EBV shedding in saliva samples collected weekly for five weeks.

Status: Patient recruitment has been performed, and analyses of the EBV shedding in saliva are underway. Results are expected in Q2 2026.

Participating centres

- Haukeland University Hospital, Bergen
- Stavanger University Hospital, Stavanger
- Førde Hospital, Førde
- Haugesund Hospital, Haugesund
- Oslo University Hospital, Oslo
- Akershus University Hospital, Lørenskog
- Stavanger University Hospital, Stavanger
- Vestre Viken Hospital, Drammen

Funding

- The Norwegian MS Society
- The Regional Health Authority of Western Norway
- Horizon Europe
- Meyer Nyquist Legacy
- The Research Council of Norway, Neuro-SysMed
- Haukeland University Hospital
- The University of Bergen
- Participating hospitals

The TAF-MS 1 Study: Tenofovir Alafenamide Fumarate (TAF) and Epstein-Barr Virus Activity in People with Multiple Sclerosis

Disease: Multiple sclerosis
Type of study: Interventional trial


Coordinating Investigator: Øivind Torkildsen
Study Director: Kjell-Morten Myhr

Background: Novel insights from the MS research group indicate that infection with the Epstein-Barr virus (EBV) is the leading cause of MS. As an EBV infection is persistent for life, the virus could function as a trigger or driver of MS disease activity. If results from a clinical trial could confirm that targeting EBV reduces MS disease activity, it would result in a paradigmatic change in our understanding of MS and the management of the disease. In collaboration with researchers at Harvard University, Boston, USA, we have identified a highly interesting candidate drug targeting EBV, not yet evaluated in MS patients. This trial could lead to a new paradigm in MS therapy, as it will evaluate a drug that may target the underlying cause of the disease.

The objective of this study is to investigate the safety and efficacy of tenofovir alafenamide (TAF) on Epstein-Barr virus infection in patients with relapsing-remitting MS (RRMS).

Design: This is a randomised double-blinded, placebo-controlled trial comparing the safety and efficacy of tenofovir alafenamide fumarate (TAF) 25 mg daily (n=25) to placebo (n=25) on EBV viral infection in stable RRMS patients receiving natalizumab therapy. The study is as a part of the EBV-MS Horizon Europe project..

The primary endpoint is safety and tolerability of the drug, and the key secondary endpoint is the change in EBV shedding in the saliva during 6 months of treatment.

Status: Inclusion of patients started early 2024 and was fully recruited (n=50) by February 2025. The follow-up was completed in Q3/Q4 2025, and results are expected to be available by Q1/Q2 2026.

Participating centres

- Haukeland University Hospital, Bergen
- Stavanger University Hospital, Stavanger
- Førde Hospital, Førde
- Haugesund Hospital, Haugesund
- Oslo University Hospital, Oslo
- Akershus University Hospital, Lørenskog
- Vestre Viken Hospital, Drammen

Funding

- The Norwegian MS Society
- The Regional Health Authority of Western Norway
- Horizon Europe
- Meyer Nyquist Legacy
- The Research Council of Norway, Neuro-SysMed
- Haukeland University Hospital
- The University of Bergen
- Participating hospitals
- Gilead Sciences, USA

The TAF-DELTA Study: Dose Escalation of Tenofovir Alafenamide on Epstein–Barr Virus Activity in Healthy Individuals

Disease: Epstein–Barr virus infection (EBV)
Type of study: Interventional trial


Coordinating Investigator: Andrea Kyvik Habbestad
Study Director: Øivind Torkildsen

Background: Novel insights from our MS Node and others indicate that Epstein–Barr virus (EBV) infection is a necessary cause of multiple sclerosis (MS). EBV infection is lifelong, and periodic viral reactivation may contribute to immune activation and disease progression. However, there are currently no approved antiviral therapies targeting EBV.

Tenofovir alafenamide fumarate (TAF) is a nucleotide analogue with established safety in HIV and hepatitis B treatment. Recent *in vitro* studies have demonstrated that TAF potently inhibits lytic EBV replication, with markedly stronger effects than conventional anti-herpesvirus drugs. Clinical data on the effect of TAF on EBV activity in humans are lacking, and the optimal dose required to achieve antiviral effects against EBV is unknown.

The TAF-DELTA study is designed as a first-in-human dose-escalation study to evaluate the safety and biological effects of increasing doses of TAF on EBV activity in healthy EBV-seropositive individuals. The study will generate critical safety and mechanistic data to inform the design of future randomised controlled trials targeting EBV in MS and other EBV-associated diseases.

Objective: The primary objective of the study is to evaluate the safety and tolerability of escalating doses of tenofovir alafenamide fumarate (25 mg, 50 mg, and 100 mg daily) in healthy EBV-seropositive individuals.

Secondary objectives are to investigate the effect of TAF on EBV oral shedding in saliva, EBV-specific $CD4^+$ T-cell responses measured by ELISPOT, and EBV-specific IgG antibody levels.

Design: This is a prospective, phase IIa, interventional, within-participant dose-escalation study, as a part of the EBV-MS Horizon Europe project. A total of 45 healthy EBV-seropositive adults aged 18–65 years will be included. Participants will undergo a four-week baseline period without treatment, followed by sequential treatment with TAF 25 mg daily for four weeks, 50 mg daily for four weeks, and 100 mg daily for four weeks, with close safety monitoring throughout the study.

The primary endpoint is the number of participants experiencing treatment-emergent adverse events or serious adverse events during the study period. Secondary endpoints include changes in EBV shedding frequency in saliva, EBV-specific $CD4^+$ T-cell responses, and EBV-specific antibody levels at each dose level compared with baseline.

Status: Regulatory approvals are currently being obtained. First patient inclusion is planned for spring 2026. Recruitment is expected to be completed within six months, and final study completion is anticipated in early 2027.

Participating centres:

- Haukeland University Hospital, Bergen, Norway
- Oslo University Hospital, Oslo, Norway

Funding:

- The Regional Health Authority of Western Norway
- Haukeland University Hospital
- The University of Bergen

The TARGET-EBV in MS Study: Targeting Epstein–Barr Virus with Tenofovir Alafenamide in Multiple Sclerosis

Disease: Multiple sclerosis
Type of study: Interventional trial

Coordinating Investigator: Marton Kønig
Study Director/Overall Project Coordinator for EBV-MS (Horizon Europe): Øivind Torkildsen.
Study Director OUH: Gro Owren Nygaard

Background
Epstein-Barr virus (EBV) infection is the strongest known environmental risk factor for multiple sclerosis (MS), but it remains unclear whether EBV only triggers the disease or also contributes to ongoing disease activity. Current disease-modifying therapies mainly target downstream inflammatory pathways and do not directly address a potential viral driver of MS.

Tenofovir alafenamide fumarate (TAF) is a well-established antiviral drug used in the treatment of hepatitis B and in HIV prevention. Experimental studies have shown that TAF inhibits lytic replication of EBV, and epidemiological observations suggest that antiretroviral therapies may reduce MS disease activity. The TARGET-EBV in MS study aims to investigate whether antiviral treatment targeting EBV can reduce neuronal damage and disease activity in MS.

The primary objective is to evaluate whether TAF reduces neuronal damage in MS patients treated with anti-CD20 therapy.

The primary endpoint is the change in cerebrospinal fluid neurofilament light chain (NfL) levels from baseline to week 52. Key secondary outcomes include changes in microglial activation measured by TSPO-PET imaging, fatigue assessed by patient-reported outcomes, paramagnetic rim lesions on MRI, and EBV viral shedding and viral load.

Design:
This is a prospective, multicentre, randomised, double-blind, placebo-controlled phase IIb clinical trial, as a part of the EBV-MS Horizon Europe project. Participants receiving stable anti-CD20 therapy will be randomised 1:1 to receive either TAF (100 mg daily) or placebo for 12 months.

Approximately 600 patients will be screened to identify eligible participants, and 60 patients will be included in the trial. The study includes advanced biomarker assessments such as cerebrospinal fluid sampling, quantitative susceptibility MRI, and TSPO-PET imaging.

Status
The first version of the protocol is approved, but dosing is under revision. Thus, the study is currently in the preparatory phase. The first patient is expected to be enrolled in August 2026. Recruitment is anticipated to last approximately one year, and participants will be followed for 12 months, with study completion expected in 2028.

Participating centres

Norway
- Oslo University Hospital, Oslo
- Haukeland University Hospital, Bergen
- Vestre Viken Hospital, Drammen
- Akershus University Hospital, Lørenskog
- Stavanger University Hospital, Stavanger

Finland
- Turku PET Centre, Turku

Funding
- Horizon Europe
- The Research Council of Norway, Neuro-SysMed
- Oslo University Hospital
- Haukeland University Hospital
- The University of Bergen
- Participating hospitals
- Gilead Sciences, USA

The NorseMS Study: A Digital Therapeutic to Improve Insomnia in Multiple Sclerosis – A Randomised Controlled Trial

Disease: Multiple sclerosis
Type of study: Interventional trial



Coordinating Investigator: Simen B. Saksvik (NTNU)
Study Directors: Håvard Kallestad (NTNU)
& Lars Bø (HUH/UiB)

Background: Insomnia is prevalent among individuals with multiple sclerosis (MS). Improving sleep is an important therapeutic goal, but there is currently a lack of effective treatment options. Cognitive Behavioural Therapy for Insomnia (CBT-I) has been widely studied in other patient groups and is currently recommended as first-line treatment for chronic insomnia.

Overall, the availability of CBT-I has been limited, as the number of patients in need of treatment far exceeds the number of available therapists. Therefore, fully automated digital adaptations of CBT-I (dCBT-I) have been developed that contain both screening and intervention. Whether this treatment is effective for patients diagnosed with MS or if improved sleep can lead to reduced daytime fatigue in MS is, however, currently unknown.

The objective of this study is to investigate the efficacy and safety of dCBT-I in patients with MS.

Design: This is a multicentre parallel-group randomised controlled trial of 650 persons with MS with self-reported insomnia allocated 1:1 to either dCBT-I or a digital control-condition consisting of patient education about sleep.

The primary endpoint is to evaluate whether dCBT-I is effective in reducing insomnia severity in patients with MS.

Status: Inclusion started in November 2024, and by December 2025, a total of about 630 patients were included. The inclusion will end by March 2026 – and the first results are expected in Q3 2027.

Participating centres

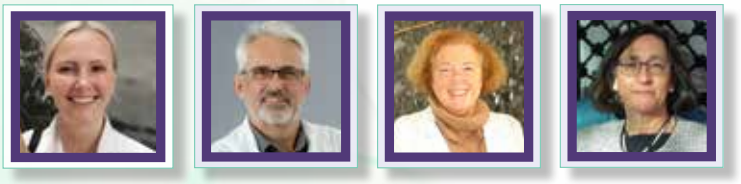
- St. Olav's Hospital, Trondheim
- Haukeland University Hospital, Bergen
- The Norwegian University of Science and Technology, Trondheim
- The University of Bergen

Funding

- The Norwegian MS Society
- St. Olav's Hospital, Trondheim
- The Norwegian University of Science and Technology, Trondheim
- The Central Regional Health Authority of Norway
- Haukeland University Hospital, Bergen
- The University of Bergen
- The Foundation DAM

The 3TR Study – Taxonomy, Treatment, Target and Remisson

Disease: Multiple sclerosis
Type of study: Observational trial



Coordinating Investigator: Andrea Kyvik Habbestad
Study Directors: Kjell-Morten Myhr, Norway, Luisa María Villar Guimerans, Hospital Universitario Ramón y Cajal, Madrid, Spain, & Marta Alarcon Riquelme, University of Granada, Granada, Spain

Background: Targeted treatment of immune-mediated diseases is a general challenge due to heterogeneous disease courses and treatment responses. There is a lack of biomarkers to guide treatment decisions and adjustment of therapies due to clinical, laboratory, or imaging-defined breakthrough disease activity.

The objective of this study is to evaluate the efficacy and safety of different immunomodulatory therapies for different immune-mediated diseases, to define treatment response biomarkers to develop personalised therapies within inflammatory bowel diseases, rheumatological diseases, respiratory diseases, and multiple sclerosis.

Design: This is a multicentre observational study of the treatment response of immunomodulatory therapies for different immune-mediated diseases.

The primary endpoint is to define biomarkers for the treatment response of immunomodulatory therapies for different immune-mediated diseases.

Status: In 2025, ten centres in Norway, Germany, Belgium, the Netherlands, Switzerland, Italy, and Spain included 285 patients, and 31 of them were included at Haukeland University Hospital. The last follow-up visit will be in Q1 2027. Multi-omics analyses are currently performed on available samples. The first results are expected in Q2/Q3 2027.

Participating centres

- Haukeland University Hospital, Bergen
- The University of Bergen
- Hospital Universitario Ramón y Cajal, Madrid, Spain
- Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico, Milan, Italy
- Academic Medical Centre, University of Amsterdam, the Netherlands
- Charité-Universitätsmedizin Berlin, Germany
- Universiteit Hasselt, Belgium
- The University of Basel, Basel, Switzerland
- Hospital Clinic of Barcelona, Barcelona, Spain
- University of Genova, Genova, Italy
- Hospital Reina Sofía, Córdoba, Spain

Funding

- Haukeland University Hospital, Bergen, Norway
- The University of Bergen, Norway
- Horizon 2020 / IMI European Union
- Participating centres

The N-DOSE Study: A Dose Optimisation Trial of Nicotinamide Riboside in Parkinson's Disease

Disease: Parkinson's disease
Type of study: Interventional trial


Coordinating Investigator: Haakon Berven
Study Director/Chief Investigator: Charalampos Tzoulis

Background: While our previous findings nominate NR as therapy for PD, the observed effects were heterogeneous across the study population, raising the question of individualised dose-dependent responses. Thus, the optimal NR dose for neurological intervention is unknown. N-DOSE is a dose-optimisation trial of NR in PD, which will address this important knowledge gap.

The objective of the N-DOSE study is to determine the optimal biological dose (OBD) for NR, defined as the dose required to achieve maximal cerebral NAD increase (measured by 31P-MRS or CSF metabolomics), or maximal alteration in cerebral metabolism patterns (measured by FDG-PET), or maximal proportion of MRS-responders, in the absence of unacceptable toxicity.

Design: N-DOSE is a randomised double-blinded placebo-controlled trial (RCT) to assess the optimal biological dose for nicotinamide riboside (NR) in PD. Individuals with PD (n = 80) will be randomised in a 1:1:2 ratio to three groups: placebo, 1000 mg NR daily, or a dose-escalation group starting with 1000 mg daily and escalating to 2000 mg and 3000 mg at one-month intervals. Measures will include clinical, neuroimaging (31P-MRS, FDG-PET), molecular, and biochemical endpoints. Study duration will be three months.

Primary endpoint: The between-visit change in cerebral NAD levels measured by 31P-MRS.

Status: The study was concluded in April 2025. Publication is expected in 2026.

Participating centre

- Haukeland University Hospital, Bergen

Funding

- The Research Council of Norway, Neuro-SysMed
- The Research Council of Norway, KOMMERSFORSK
- The Regional Health Authority of Western Norway
- The Norwegian Parkinson's Disease Association
- Haukeland University Hospital

The NADbrain Study: A Pharmacokinetic Study of NAD Replenishment in Human Blood and Brain

Disease: Parkinson's disease
Type of study: Interventional trial


Coordinating Investigator: Christian Dölle
Study Director/Chief Investigator: Charalampos Tzoulis

Background: To further develop the potential of NAD augmentation therapy (NAD-AT) as a neuroprotective therapy, we need to determine the optimal dosing regimen, including dose size and frequency. The NADbrain study aimed to establish the optimal dosing regimen by performing a parallel assessment of NAD-AT pharmacokinetics in the blood and brain of healthy human subjects and subjects with Parkinson's disease (PD).

The primary objective of the NADbrain study was to determine the blood and brain pharmacokinetics of NAD augmentation therapy (NAD-AT) using nicotinamide riboside (NR) or nicotinamide mononucleotide (NMN) as NAD biosynthetic precursors.

Design: The NADbrain study performed a parallel assessment of NAD-AT pharmacokinetics in the blood and brain of healthy human subjects. In a first stage, a total of 6 healthy individuals (3 men and 3 women) underwent repeated blood sampling and 31P-MRS brain scans during two 20-day periods, each of which started with 8 days of daily intake of nicotinamide riboside (NR) 600mg x 2, or nicotinamide mononucleotide (NMN) 600mg x 2, followed by a washout period for 11 days. The two 20-day periods were at least 14 days apart to allow for further washout of the previous compound.

In a second stage, a total of 6 healthy individuals (3 men and 3 women) and 6 individuals with PD (3 men and 3 women) received NR 600 mg x 2 daily for 4 weeks, with a total measurement/assessment period of 7 weeks, and underwent repeated blood sampling and 31P-MRS brain scans once per week during this time.

Blood samples were analysed for NAD and related metabolites. The simultaneous change in the NAD metabolome over time in blood and brain was assessed, and blood and brain pharmacokinetics for NAD-AT in humans were established.

Primary endpoint: The change of cerebral NAD levels (measured by 31P-MRS) and of blood NAD-metabolites (measured by NADmed assay and LC/MS analysis), over time, after the administration of oral NAD-AT with the NAD precursors NR 600 mg x 2 daily or NMN 600 mg x 2 daily.

Status: The study was concluded in 2024, accepted for publication in 2025 and published in January 2026.

Participating centre

- Haukeland University Hospital, Bergen

Funding

- The Norwegian Parkinson's Disease Association
- The Research Council of Norway, Neuro-SysMed
- The Research Council of Norway, KOMMERSFORSK
- The Regional Health Authority of Western Norway
- Haukeland University Hospital

The NOPARK Study: A Phase III Randomised Controlled Trial of Nicotinamide Riboside in Early Parkinson's Disease

Disease: Parkinson's disease
Type of study: Interventional trial


Coordinating Investigator: Brage Brakedal
Study Director/Chief Investigator: Charalampos Tzoulis

Background: Parkinson's disease (PD) is a major cause of death and disability and has a devastating global socioeconomic impact. Available treatments are purely symptomatic, and there is an urgent need for disease-modifying therapies. Previous research by Neuro-SysMed and others suggests that nicotinamide adenine dinucleotide (NAD) replenishment therapy may be neuroprotective in PD and delay neurodegeneration and clinical disease progression. Encouraged by these findings, we are conducting NOPARK, a Phase III double-blinded randomised clinical trial of oral NR in early PD.

The primary objective of the NOPARK study is to determine whether a high dose of oral NR delays disease progression in PD, as measured by change in total MDS-UPDRS.

Design: NOPARK is a Phase III, double-blind, randomized, parallel-group clinical trial of oral NR 500 mg twice daily in early-stage PD. NOPARK aimed to enrol 400 participants with early-stage PD (within two years from diagnosis) from 11 centres across Norway. Participants received NR or a placebo for 52 weeks and were assessed at five consecutive visits.

Primary endpoint: The between-group (NR vs. placebo) difference of the change in the total MDS-UPDRS score between baseline and end of study (week 52).

Status: The study was concluded in 2025, with the data analysed in December 2025. Publication and dissemination of the results will be done in 2026.

Participating centres

- Haukeland University Hospital, Bergen, Norway
- Akershus University Hospital, Norway
- University of Oslo, Campus Akershus University Hospital, Norway
- Vestre Viken Hospital, Norway
- Østfold Hospital, Norway
- Nordlandssykehuset, Bodø, Norway
- University Hospital of North Norway, Tromsø, Norway
- Førde Hospital, Norway
- Sørlandsklinikken, Arendal, Norway
- Sørlandet Hospital, Kristiansand, Norway
- Haugesund Hospital, Haugesund, Norway
- Molde Hospital, Norway

Funding

- KLINBEFORSK
- The Regional Health Authority of Western Norway
- The Research Council of Norway, Neuro-SysMed
- Haukeland University Hospital
- Participating hospitals

The NOPARK Extension Study: An Open Label Trial of Long-Term Treatment with Nicotinamide Riboside (NR) in Parkinson's Disease

Disease: Parkinson's disease
Type of study: Interventional trial


Coordinating investigator: Brage Brakedal
Study director/Chief Investigator: Charalampos Tzoulis

Background: We are conducting a Phase II, double-blind, randomised clinical trial of oral nicotinamide riboside (NR) in early Parkinson's disease (PD) (see the NOPARK study). To evaluate the long-term safety of NR in PD and to offer participants the opportunity to benefit from potential neuroprotective effects, we are conducting an open-label extension study offering to enrol all participants who completed the NOPARK trial.

The primary objective of the NOPARK extension study is to assess the safety profile of long-term treatment with oral NR.

Design: The NOPARK extension study is an open-label study of oral NR, 600 mg twice daily in PD. It is recruiting participants who have completed the NOPARK study from 11 centres across Norway.

Primary endpoint: The frequency of reported adverse events (AE) among all participants in the NOPARK open-label extension.

Status: The study was concluded in June 2025.

Participating centres

- Haukeland University Hospital, Bergen, Norway
- University of Oslo, Campus Akershus University Hospital, Norway
- Vestre Viken Hospital, Norway
- Østfold Hospital, Norway
- Bodø Hospital, Norway
- University Hospital of North Norway, Tromsø, Norway
- Førde Hospital, Norway
- Sørlandsklinikken, Arendal, Norway
- Sørlandet Hospital, Kristiansand, Norway.
- Haugesund Hospital, Haugesund, Norway
- Molde Hospital, Norway, Norway

Funding

- KLINBEFORSK
- The Regional Health Authority of Western Norway
- The Research Council of Norway, Neuro-SysMed
- Haukeland University Hospital
- Participating hospitals

The NADAPT Study: A Phase II Randomised Controlled Trial of NAD Replenishment Therapy for Atypical Parkinsonism

Disease: Parkinson's disease
Type of study: Interventional trial



Coordinating Investigators:
Geir Olve Skeie & Gard S. Johanson
Study Director/Chief Investigator: Charalampos Tzoulis

Background: Atypical parkinsonian syndromes (APS), including progressive supranuclear palsy (PSP), multiple system atrophy (MSA), and corticobasal syndrome (CBS), are major and entirely unaddressed health challenges. There are currently no treatments able to improve function or delay disease progression in APS, and patients succumb to rapidly increasing disability, with an estimated overall survival of 3-10 years from diagnosis. Despite their devastating health impact, there is currently no clinical treatment research on PSP, MSA, or CBS in Norway, and very few initiatives globally.

Groundbreaking research from the Tzoulis group has nominated the NAD-precursor nicotinamide riboside (NR) as a potential disease-modifying therapy for neurodegenerative parkinsonisms. Motivated by this discovery, we will perform the NADAPT study: a Phase II, double-blind, randomised trial of NR in PSP, MSA, and CBS. Given the dismal prognosis and complete lack of treatment options for individuals with APS, this trial is both timely and necessary.

The primary objective of the NADAPT study is to determine whether treatment with NR, 3000 mg daily, can delay disease progression in PSP, MSA, and/or CBS.

Design: NADAPT is a Phase II double-blind randomised clinical trial of oral NR in APS. Eligible participants will be recruited into three parallel cohorts, including PSP (n=130), MSA (n=165) and CBS (n=30-50). In each cohort, participants will be randomised 1:1 on NR 1500 mg twice per day or placebo and followed for 78 weeks. Participants will be recruited from Norway, the UK, and France.

Primary endpoint: The between-group (NR vs. placebo) difference in the change from baseline to end of study in disease-specific clinical severity scores (PSPRS, UMSARS, etc.).

Status: The study is ongoing and has ~40 participants enrolled.

Participating centres

- Haukeland University Hospital, Bergen, Norway
- Akershus University Hospital, Norway
- University of Oslo, Campus Akershus University Hospital
- Vestre Viken Hospital, Norway
- University Hospital of North Norway, Tromsø, Norway
- Førde Hospital, Norway
- Sørlandsklinikken, Arendal, Norway
- Haugesund Hospital, Haugesund, Norway
- Molde Hospital, Norway

Funding

- The Norwegian Parkinson's Disease Association
- KLINBEFORSK
- The Regional Health Authority of Western Norway
- The DAM Foundation
- The Research Council of Norway, Neuro-SysMed
- Haukeland University Hospital
- Participating hospitals

SLEIPNIR: A randomized, Phase 2a, double-blinded, biomarker-driven, multi-arm platform trial to investigate safety, CNS penetration and target engagement of tentative disease-modifying therapies compared with placebo in male and female participants with Parkinson's disease

Disease: Parkinson's disease
Type of study: Interventional trial


Principal Investigator: Simon Kverneng
Study Director/Chief Investigator: Charalampos Tzoulis

Background: There are currently no approved disease-modifying therapies (DMTs) for Parkinson's disease (PD), and all efficacy trials of tentative DMTs to date have yielded negative results. At the same time, the number of candidate investigational medicinal products (IMPs) and early-phase DMT trials is rapidly increasing. Given the high cost and failure rate of efficacy trials in PD, there is an urgent need for a strategic approach to identify and prioritize compounds with the greatest potential to impact disease progression. Two critical factors must be assessed early in clinical development:

- Target penetration: does the compound and/or its active metabolites reach the human central nervous system (CNS)?
- Target engagement: does the compound engage and modulate its intended biological target in the human CNS, in the context of the disease?

SLEIPNIR is a biomarker-driven, Phase 2a multi-arm platform trial designed to address this translational gap by evaluating CNS penetration and target engagement of investigational products in individuals with PD. By testing multiple IMPs in parallel against a shared placebo group, the platform enables efficient, rigorous, and ethical triaging of candidate compounds prior to advancing to large, costly clinical efficacy trials. This approach promotes evidence-based decision-making, reduces participant burden, and accelerates the development of effective DMTs for PD.

Primary objectives: (I) assess safety and tolerability of IMPs, (ii) evaluate the CNS bioavailability of IMPs with potential DMT-effect in participants with PD, and (iii) assess evidence of target engagement in the CNS.

Primary endpoints: (i) the between-group (active treatment vs. placebo) difference in incidence and severity of adverse events and treatment compliance, (ii) cerebrospinal (CSF)-to-plasma concentration ratio of IMPs and/or their active metabolites at steady state (Week 12) measured by appropriate methodology for each compound, and (iii) change from baseline to Week 12 in biomarkers of target engagement, specific for each compound.

Status: SLEIPNIR will launch with three parallel study arms testing three different IMPs. The master protocol and two sub-protocols were finalized and prepared for CTIS submission during 2025, while the third sub-protocol is in finalization. Recruitment is planned to start in Q2 2026, pending CTIS approval.

Participating centre

- Haukeland University Hospital, Bergen, Norway

Funding

- Research Council of Norway
- Western Norway Regional Health Authority
- Norwegian Parkinson's Association
- Cure Parkinson's (UK-based charity)

HYDRA: An Adaptive Multiarm Multistage Clinical Trial for Parkinson's Disease

Disease: Parkinson's disease
Type of study: Interventional trial


Coordinating Investigator: Geir Olve Skeie
Study Director/Chief Investigator: Charalampos Tzoulis

Background: There are no disease-modifying therapies (DMTs) for PD and current trial designs are highly inefficient. The HYDRA initiative aims to revolutionise PD trials through an adaptive, multi-arm, multi-stage (MAMS) platform trial. This innovative approach simultaneously evaluates multiple DMTs against a single placebo, with the flexibility to discontinue ineffective treatments and reallocate participants to more promising arms. HYDRA will include 800 participants from 12 centres across Norway and test the efficacy of three potential DMTs in delaying the progression of PD, assessed by the total MDS-UPDRS score. Secondary outcomes include cognitive function, daily life activities, quality of life, and caregiver impact. Exploratory objectives involve digital and molecular biomarkers, long-term treatment effects, and personalised medicine strategies.

HYDRA's adaptive design ensures rigorous drug selection and employs a decentralised approach to minimise participant discomfort and enhance national recruitment. This platform will provide conclusive evidence on DMT efficacy within a 5-year period, potentially leading to regulatory approval and transforming PD treatment paradigms. The HYDRA initiative promises to enhance trial efficiency, accelerate therapeutic breakthroughs, reduce trial costs and duration, and improve the quality of life for individuals with PD. The study will recruit participants from across all four health regions of Norway. Additional participants will be recruited by our international partners, as necessary.

The primary objective: The HYDRA initiative aims to accelerate breakthroughs in the field of PD therapeutics by testing multiple potential disease-modifying therapies (DMTs) in parallel, with significantly fewer participants, shorter trial time, and substantially lower costs, compared to testing these treatments individually.

The primary objective is to evaluate whether the tested compounds can delay the progression of PD.

Primary endpoint: The between-group (NR vs. placebo) difference of the change in motor severity, measured by MDS-UPDRS total score (sum of parts I, II, and III) between baseline and end of study (week 52).

Status: The study has established its governing bodies, with its board and PPI group having two meetings in 2025. HYDRA has received funding from the Regional Health Authority of Western Norway and the Norwegian Parkinson Association, and further funding is sought from KlinBeForsk. The compounds are currently being secured, and the master protocol and two subprotocols are being established. Recruitment is planned to start in early 2027.

Participating centres

- Haukeland University Hospital, Bergen, Norway
- University of Oslo, Campus Akershus University Hospital, Norway
- Akershus University Hospital, Norway
- Vestre Viken Hospital, Norway
- Østfold Hospital, Norway
- Nordlandssykehuset, Bodø, Norway
- University Hospital of North Norway, Tromsø, Norway
- Førde Hospital, Norway
- Sørlandsklinikken, Arendal, Norway
- Sørlandet Hospital, Kristiansand, Norway
- Haugesund Hospital, Haugesund, Norway
- Molde Hospital, Norway
- Lillehammer Hospital, Norway
- Telemark Hospital, Norway

Funding

- KLINBEFORSK
- The Regional Health Authority of Western Norway
- The Research Council of Norway, Neuro-SysMed
- Haukeland University Hospital
- Participating hospitals
- Norwegian Parkinson AssociationHaukeland University Hospital
- Participating hospitals
- Norwegian Parkinson Association

NADream: A Randomised Double-blind Trial to Explore the Effects of NAD Augmentation Therapy on Sleep Physiology

Disease: Healthy individuals
Type of study: Interventional trial


Coordinating Investigator: Katarina Lundervold
Study Director: Charalampos Tzoulis

Background: Sleep physiology is strongly associated with pathological brain aging and neurodegenerative disorders, including Parkinson's disease (PD), dementia with Lewy bodies (DLB), multiple system atrophy (MSA), and Alzheimer's disease. Our earlier trials in PD, have provided post-hoc signals indicating that NAD-augmentation therapy with oral NR may have beneficial effects on human sleep physiology. This is also supported by studies in rodents. However, the effects of NAD-augmentation therapy on human sleep physiology have not been formally studied.

NADream is a randomised, double-blind, placebo-controlled, Phase I study, which will explore the effects of NAD-augmentation therapy on human sleep. A total of 20 healthy volunteers will be recruited and randomized on NR 2000 mg per day or placebo for 4 weeks. In addition, a subset of participants will undergo two cycles of sleep deprivation at baseline and the end of the trial. Measurements will include polysomnography to quantitatively assess relevant electrophysiological properties of the brain, such as sleep pressure, as well as a multitude of clinical and biochemical assessments. Based on the results of the **NADream** trial, we will design and implement appropriate measures of treatment effects on sleep in our NAD-trials in neurodegenerative and neuroinflammatory diseases. Moreover, we will identify whether oral NR treatment has potential to improve sleep quality in health and disease.

Objectives: The trial is exploratory. The main objective is to assess the effects of NR on the quality of sleep (polysomnography- and questionnaire-based endpoints) and on the recovery rate from sleep deprivation (i.e., quantification of sleep pressure and clinical rating).

Status: The study is funded, and protocol has been established during 2024-2025. Recruitment started in Q2 2025 and 5 participants have been randomized so far.

Participating centre

- Haukeland University Hospital, Bergen, Norway

Funding

- The Research Council of Norway, Neuro-SysMed
- Haukeland University Hospital
- The University of Bergen

The NADage Study: A Randomised Double-blind Trial of NAD Replenishment Therapy on Aging

Disease: Age-related frailty and associated cognitive dysfunction
Type of study: Interventional trial

Coordinating investigator: Katarina Lundervold
Study director: Charalampos Tzoulis

Background: Frailty is a major source of morbidity and disability, as well as a prodromal state for cognitive impairment and dementia. Thus, frailty allows us to intervene in pre-dementia states before neurodegeneration has reached a point of no return. Preclinical and clinical evidence supports that NAD-replenishment therapy with NR targets molecular processes that play key role in frailty and neurodegeneration (i.e., mitochondrial function, proteostasis, and neuroinflammation). We will, therefore, test whether NR treatment can ameliorate frailty and associated cognitive, motor, and other forms of dysfunction.

In the NADage trial, 100 trial participants will be recruited and randomly assigned (1:1) to either NR 2,000 mg (1,000 mg x 2) daily (n=50), or placebo (n=50) for a 52-week period. During the study period, participants will be assessed at five in-clinic visits (week 0, 12, 26, 40, 52) with clinical, neuroimaging, and laboratory measures, in addition to long-term monitoring using wearables.

Primary objective is to assess the efficacy of NR in improving motor function in elderly, community-dwelling, frail individuals.

Status: Funding is secured, and screening started in Q4 2024, recruitment was initiated in Q1 2025 and 22 participants have been randomized by end of 2025.

Participating centre

- Haukeland University Hospital, Bergen, Norway

Funding

- ERA4HEALTH (Nutribrain programme)
- The Research Council of Norway, Neuro-SysMed
- Haukeland University Hospital
- The University of Bergen
- The DAM Foundation
- The GC Rieber Foundation

NOR-RBD: A Longitudinal Cohort and Clinical Trial Platform for Prodromal α-Synucleinopathies

Disease: Parkinson's disease
Type of study: Observational trial


Coordinating investigator: Johannes Jernqvist Gaare
Study director: Charalampos Tzoulis

Background: α-synucleinopathies are an important group of relentlessly progressive, debilitating, and incurable neurodegenerative disorders, comprising Parkinson's disease (PD), dementia with Lewy bodies (DLB), and multiple system atrophy (MSA). Before the diseases become clinically manifest, they are preceded by a long prodromal phase that can last up to 20 years. Current treatments make no impact on disease progression, and trials of potential disease-modifying therapies have so far been unsuccessful. There is a need to shift our efforts from treatment to prevention by initiating interventions in the prodromal phase of the disease.

REM-sleep behaviour disorder (RBD) is a parasomnia, characterised by loss of muscle atonia during REM-sleep, resulting in dream enactment. Isolated RBD (iRBD, i.e. RBD without other overt neurodegenerative manifestations) is associated with an exceedingly high risk of future development of an α-synucleinopathy and is considered to be the most specific marker of being in the prodromal stage of an α-synucleinopathy. After 15 years, > 90% of individuals with iRBD will have developed PD, DLB or MSA.

The NOR-RBD platform is an initiative with three main goals: 1) establish a longitudinal cohort of individuals with iRBD to facilitate the development of predictive biomarkers for risk stratification; 2) establish a structured health care program for individuals in the prodromal stages of α-synucleinopathies; 3) initiate neuroprotective clinical trials in iRBD patients.

The overarching objective of the project is to establish the NOR-RBD platform for longitudinal follow up for patients with prodromal α-synucleinopathy (as defined by the presence of iRBD) and initiate neuroprotective clinical trials.

Status: The study began recruitment in Q2 2025.

Participating centres

- Haukeland University Hospital, Bergen, Norway (recruiting nationally from more sites from 2026)

Funding

- The Regional Health Authority of Western Norway
- The Research Council of Norway, Neuro-SysMed
- Haukeland University Hospital
- Participating hospitals

The STRAT-PARK Study: A Prospective Multimodal Cohort Study to Stratify Parkinson's Disease and Other Parkinsonisms

Disease: Parkinson´s disease (PD), dementia with Lewy bodies (DLB), progressive supra-nuclear palsy (PSP), multiple system atrophy (MSA), and corticobasal syndrome (CBS)
Type of study: Observational trial



Coordinating Investigators: Simon Kverneng & Kjersti Stige
Study Director: Charalampos Tzoulis

Background: Neurodegenerative parkinsonisms (NDPs) affect more than 10 million people worldwide today and an estimated 20 million by 2040. NDPs are divided into the phenotypically defined syndromes of Parkinson´s disease (PD), dementia with Lewy bodies (DLB), progressive supranuclear palsy (PSP), multiple system atrophy (MSA), and corticobasal syndrome (CBS). To date, all trials of putative neuroprotective agents for NDP have been invariably unsuccessful, and evidence suggests that this may largely be due to substantial molecular heterogeneity underlying each of these disorders. The vast clinicopathological diversity observed within each NDP entity (i.e., PD, PSP, MSA, CBD) has led to the hypothesis that each of these may not be a single pathogenic entity, but rather multiple disorders that are driven by different molecular processes and may, therefore, respond differently to therapies targeting specific biological pathways. Under this assumption, clinical trials of potential neuroprotective compounds should not be addressing each NDP syndrome as a single entity but rather target specific subgroups of patients with a homogeneous pathophysiology. However, efforts to identify molecular disease subtypes have not been successful.

The STRAT-PARK initiative is a multi-centre longitudinal cohort study aiming to stratify NDPs according to underlying biological mechanisms, so that tailored treatments can be developed and applied.

The primary objective of the STRAT-PARK initiative is to stratify and/or reclassify neurodegenerative parkinsonisms (NDP), according to underlying molecular disease mechanisms, and develop clinically applicable biomarkers enabling: (i) the classification of patients for participation in targeted clinical trials and (ii) monitoring of treatment efficacy in targeted clinical trials.

Status: STRAT-PARK is ongoing and a total of ~365 participants have been recruited at the end of 2025. The study protocol and characteristics of the population were published in 2024. Analyses of the collected material and data are ongoing and five original papers were published in 2025[1–5]. Additionally, one paper was under review/revision and published in January of 2026[6].

Participating centres

- Haukeland University Hospital, Bergen, Norway
- St. Olav's University Hospital, Trondheim, Norway
- London Movement Disorders Centre, and Centre of Excellence for Parkinson's disease, the Lawson Institute for Research, London, Ontario, Canada

Funding

- Michael J Fox Foundation
- Gerda Meyer Nyquist Guldbrandson and Gerdt Meyer Nyquist Fund
- Helse Midt-Norge
- The Research Council of Norway, Neuro-SysMed
- Haukeland University Hospital
- Participating hospitals

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D-SPARK: A Randomized Double Blind Clinical Trial of D-Serine for Modifying Parkinson's Disease Progression

Disease: Parkinson's disease
Type of study: Interventional trial


Coordinating Investigator: Haakon Berven
Study Directors: Charalampos Tzoulis

Background: Increasing evidence supports that modulation of the N-methyl-D-aspartate (NMDA) receptor may have therapeutic benefits in neurodegenerative diseases. D-serine is an amino acid that functions as a full agonist of the glycine site of NMDA receptors, which are important for synaptic plasticity, motor control, and neuronal survival. NMDA receptor-mediated neurotransmission is involved in both motor and non-motor symptoms in PD. Preclinical evidence shows that elevating endogenous glycine levels can improve motor deficits in PD models, and a 6-week crossover trial administering D-serine vs placebo in 10 persons with PD showed improved clinical rating scores with D-serine treatment.

The primary objective of the D-SPARK study is to evaluate the effect of orally administered D-serine, 2 g twice per day, versus placebo on overall symptom severity in Parkinson's disease.

Design: D-SPARK is a 70-week, randomized, double-blind, placebo-controlled Phase II study evaluating the efficacy, safety, and tolerability of D-serine in 100 participants with clinically established Parkinson's disease.

Primary endpoint: Difference between treatment groups (D-Serine vs Placebo) in mean change from baseline to week 26 in the Movement Disorder Society Unified Parkinson's Disease Rating Scale (MDS-UPDRS) Total score (sum of parts I-III).

Status: The trial obtained funding and ethics approval in 2025. It opened for participant recruitment in early January 2026, with the first participant enrolled on the 20th of January 2026.

Participating centres

- Haukeland University Hospital, Bergen, Norway
- University of Oslo, Campus Akershus University Hospital, Norway (Planned)
- Sørlandsklinikken, Arendal, Norway (planned)

Funding

- SPARK NS
- The Regional Health Authority of Western Norway
- Haukeland University Hospital

The NO-ALS Study: A Phase-II, Multicentre, Double-Blinded Randomised Clinical Trial of Oral NR and Pterostilbene in Early ALS

Disease: ALS
Type of study: Interventional trial



Coordinating Investigators: Tale L. Bjerknes & Ole-Bjørn Tysnes
Study Directors: Ole-Bjørn Tysnes & Charalampos Tzoulis

Background: There are currently no neuroprotective treatments for ALS with a significant impact on disease progression. Previous research by the PD Node and others has nominated NAD-replenishment therapy as a promising neuroprotective strategy against neurodegeneration. Moreover, a recently published small trial using a combination of the NAD precursor nicotinamide riboside (NR) and sirtuin booster pterostilbene showed encouraging findings in ALS. To evaluate the potential of this strategy as a neuroprotective therapy for ALS, we are running the NO-ALS trial.

The primary objective of the NO-ALS study is to determine whether a high dose of oral NR/pterostilbene delays disease progression in ALS, as measured by the revised ALS-FRS (ALS functioning rating scale).

Design: NO-ALS is a multicentre, Phase II randomised double-blinded clinical trial, comparing combined oral NR and pterostilbene to placebo in early ALS. A total of 180 participants will be recruited nationwide to study arm 1.

Primary endpoint: Between-group difference in the change in total ALS-FRS score between baseline and end of study.

Status: Patients have been included since October 2020. Inclusion was fulfilled in October 2025.

Participating centres

- Haukeland University Hospital, Bergen, Norway
- Akershus University Hospital, Norway
- University of Oslo, Campus Akershus University Hospital, Norway
- Vestre Viken Hospital, Norway
- St. Olav's University Hospital, Trondheim, Norway
- Stavanger University Hospital, Stavanger, Norway
- University Hospital of North Norway, Tromsø, Norway
- Førde Hospital, Norway
- Haugesund Hospital, Haugesund, Norway
- Nordlandssykehuset, Bodø, Norway
- Innlandet Hospital Trust, Lillehammer, Norway
- Molde Hospital, Norway
- Sørlandet Hospital Trust, Kristiansand, Norway

Funding

- The Regional Health Authority of Western Norway
- KLINBEFORSK
- The Research Council of Norway, Neuro-SysMed
- Haukeland University Hospital
- The University of Bergen
- Participating hospitals

The NO-ALS Extension Study: An Open Label Study of Long-Term Therapy with NR and Pterostilbene in ALS

Disease: ALS
Type of study: Interventional trial



Coordinating Investigators: Tale L. Bjerknes & Ole-Bjørn Tysnes
Study Directors: Ole-Bjørn Tysnes & Charalampos Tzoulis

Background: There are currently no neuroprotective treatments for ALS with a significant impact on disease progression. Previous research by the PD Node and others has nominated NAD-replenishment therapy as a promising neuroprotective strategy against neurodegeneration. Moreover, a recently published small trial using a combination of the NAD precursor nicotinamide riboside (NR) and sirtuin booster pterostilbene showed encouraging findings in ALS. To evaluate the potential of this strategy as a neuroprotective therapy for ALS, we are running the NO-ALS trial.

The primary objective of the NO-ALS study is to determine whether a high dose of oral NR/pterostilbene delays disease progression in ALS, as measured by the revised ALS-FRS (ALS functioning rating scale).

Design: NO-ALS is a multicentre, Phase II randomised double-blinded clinical trial, comparing combined oral NR and pterostilbene to placebo in early ALS. A total of 180 participants will be recruited nationwide to study arm 1.

Primary endpoint: Between-group difference in the change in total ALS-FRS score between baseline and end of study.

Status: Patients have been included since October 2020. The study is expected to close its inclusion when the NO-ALS trial is concluded (end of 2026).

Participating centres

- Haukeland University Hospital, Bergen, Norway
- Akershus University Hospital, Norway
- University of Oslo, Campus Akershus University Hospital, Norway
- Vestre Viken Hospital, Norway
- St. Olav's University Hospital, Trondheim, Norway
- Stavanger University Hospital, Stavanger, Norway
- University Hospital of North Norway, Tromsø, Norway
- Førde Hospital, Norway
- Haugesund Hospital, Haugesund, Norway
- Nordlandssykehuset, Bodø, Norway
- Innlandet Hospital Trust, Lillehammer, Norway
- Molde Hospital, Norway
- Sørlandet Hospital Trust, Kristiansand, Norway

Funding

- The Regional Health Authority of Western Norway
- KLINBEFORSK
- The Research Council of Norway, Neuro-SysMed
- Haukeland University Hospital
- The University of Bergen
- Participating hospitals

The ALS LTMV Study: Effects of Long-Term Ventilation Support on the Quality of Life of ALS Patients and Their Families

Disease: ALS
Type of study: Interventional trial


Coordinating Investigators: Tale L. Bjerknes & Ole-Bjørn Tysnes
Study Director: Ole-Bjørn Tysnes

Background: The physical and psychological suffering of individuals with ALS is immense. Moreover, the lack of neuroprotective treatment and high level of disability mean that the direct and indirect costs per patient are substantial and higher than for any other neurological illness. The economic burden of ALS in the USA is estimated to be 279–472 million dollars per year. For a patient depending on tracheostomy invasive ventilation (TIV) in Norway, it is estimated that the cost of care would be more than 5 million NOK annually. The use of TIV varies substantially between countries. In England, it is rarely used, while in Japan, 29,3% of patients receive this treatment. In Europe and the USA, the use varies from 5–10%. In Norway, 6,7% of male patients and 3,7% of female patients received TIV between 2002 and 2007. Data from the National Registry for Long-Term Mechanical Ventilation (LTMV) showed that in 2017, there were 32 ALS patients treated with TIV and 81 using non-invasive ventilation (NIV). In the period 2015–2020, 256 ALS patients started LTMV. Survival of ALS patients receiving TIV varies from 8 to 89 months, probably reflecting the different countries' medical practices, organisation of care, cultural differences, and economic considerations.

Primary objective: In the present study, the aim is to increase the knowledge on how life-sustaining ventilator support with NIV or TIV affects the quality of life (QoL) in ALS patients, life partners, and children, in Norway. The results from the study may provide crucial information for clinicians and patients on one of the most difficult ethical issues of ALS treatment. We anticipate that this information will facilitate a shared decision-making process, weighing benefits and disadvantages in a wider perspective.

Design: The ALS LTMV study is an observational clinical trial, where the quality of life will be assessed in ALS participants receiving NIV or TIV.

Primary endpoint: The HRQOL, global QoL, and disease-specific QoL in ALS participants before and after the introduction of life-sustaining LTMV.

Status: The study is currently recruiting participants at Haukeland University Hospital, Oslo University Hospital, Akershus University Hospital, University Hospital of North Norway, Tromsø, St. Olav University Hospital, Sørlandet Hospital Trust, Kristiansand, and Stavanger University Hospital.

Participating centres

- Haukeland University Hospital, Bergen, Norway
- Akershus University Hospital, Norway
- University of Oslo, Campus Akershus University Hospital, Norway
- St. Olav's University Hospital, Trondheim, Norway
- Stavanger University Hospital, Stavanger, Norway
- University Hospital of North Norway, Tromsø, Norway
- Innlandet Hospital, Lillehammer, Norway
- Nordlandssykehuset, Bodø, Norway
- Sørlandet Hospital Trust, Kristiansand, Norway
- Østfold Hospital, Norway

Funding

- KLINBEFORSK
- The Research Council of Norway, Neuro-SysMed
- Haukeland University Hospital
- The University of Bergen
- Participating hospitals

N-DOSE AD: A Dose Optimisation Trial of Nicotinamide Riboside in Alzheimer's Disease

Disease: Dementia
Type of study: Interventional trial


Coordinating Investigators: Ragnhild Eide Skogseth & Kristoffer Haugarvoll
Study Director: Kristoffer Haugarvoll

Background: Alzheimer's disease (AD) is the most common progressive neurodegenerative dementia and predominantly affects older women. The prevalence of AD in Norway in 2020 was estimated to be 8.4% in individuals aged 70 years or older, the prevalence was 9,3% in women and 7.3% in men, respectively, with no disease-modifying treatment available.

It is paramount to target novel biological mechanisms therapeutically. Increasing evidence supports that boosting cellular levels of nicotinamide adenine dinucleotide (NAD) confers neuroprotective effects in both healthy aging and neurodegeneration. NAD is an essential cofactor for several metabolic reactions. Boosting NAD levels could potentially help ameliorate several major processes implicated in the pathogenesis of Alzheimer's disease, including mitochondrial respiratory dysfunction, neuroinflammation, epigenomic dysregulation, and increased neuronal DNA damage. NAD can be replenished via supplementation of nicotinamide riboside (NR), a vitamin B3 molecule and biosynthetic precursor of NAD.

Design: N-DOSE AD is a randomised double-blinded placebo-controlled trial (RCT) to assess the optimal biological dose for nicotinamide riboside (NR) in Alzheimer's dementia. Individuals with probable mild or moderate AD (n=80) will be randomised to receive placebo (n=20), 1000 mg of NR (n=20), or increasing doses (1000 mg, 2000 mg, 3000 mg) of NR (n=40) over 12 weeks. The selected dose range is within the safety limits for healthy humans.

Primary objective: To compare the effect of orally administered nicotinamide riboside (NR), escalated to 1500 mg twice per day (3000 mg/day) in the dose escalation group (DE-group), versus stable dosing of 500 mg twice per day (1000 mg/day) in the dose-stable group (DS-group) on cerebral NAD levels, at week 12.

Secondary objectives: 1) To assess the dose-response relationship between NR dose (1000 mg, 2000 mg, 3000 mg per day) and changes in cerebral NAD levels from baseline to weeks 4, 8, and 12. **2)** To compare the effectiveness of orally administered nicotinamide riboside (NR) 1500 mg twice per day versus 500 mg twice per day in augmenting the NAD-metabolome in the central nervous system (CNS) at week 12**.**

Status: The study was initiated in 2022. Study recruitment and follow-up were completed in 2025. The primary publication is in preparation.

Participating centres

- Haraldsplass Deaconess Hospital, Bergen, Norway
- Haukeland University Hospital, Bergen, Norway

Funding

- The Research Council of Norway, Neuro-SysMed
- The Regional Health Authority of Western Norway
- Haraldsplass Deaconess Hospital
- Haukeland University Hospital
- The University of Bergen

The STRAT-COG Study: A Prospective Cohort Study to Stratify Dementia

Disease: Dementia
Type of study: Interventional trial

Coordinating Investigators: Ragnhild Eide Skogseth & Kristoffer Haugarvoll
Study Directors: Ragnhild Eide Skogseth & Kristoffer Haugarvoll

Background: Dementia, including Alzheimer's disease (AD) and Dementia with Lewy bodies (DLB), is the most common group of neurodegenerative disorders. Dementia is a heterogeneous group of disorders, where a mixture of several types of pathologies is often present in individual patients.

The central hypothesis in this project is that converging molecular pathways exist across subtypes of dementia, but also that there are underlying subtypes that may not be fully reflected in the current classification system of dementia.

STRAT-COG is a study to better understand mixed pathologies in dementia and to identify sub-groups of disease that reflect underlying biology. The group proposes to identify biological overlap and disease subtypes, based on a transdisciplinary approach integrating cognitive testing, clinical investigations, neuroimaging, and molecular biomarkers. Thus, this approach will enable us to reclassify and stratify dementia according to underlying biological patterns. The study also includes a brain donation program.

Primary objective: To establish a cohort with multidimensional data that can be orderly integrated into the complex clinical and biological spectrum of dementia, and to stratify it into subclasses with homogeneous biology and prognosis. This knowledge will then be used to develop diagnostic and prognostic biomarkers and identify novel therapeutic targets.

Design: Cohort study with biannual follow-up.

Status: The study was initiated in 2022. By the end of 2025, 250 individuals living with dementia and 67 control individuals have been included. A brain bank has been established as part of the study.

Participating centres

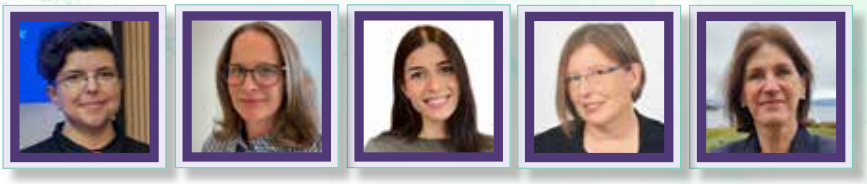
- Haraldsplass Deaconess Hospital, Bergen, Norway
- Haukeland University Hospital, Bergen, Norway

Funding

- The Research Council of Norway, Neuro-SysMed
- The Regional Health Authority of Western Norway
- Haraldsplass Deaconess Hospital
- Haukeland University Hospital
- University of Bergen

CC.AGE: Complex Conditions and Ageing

Disease: Across all four diseases
Type of study: Observational trial



Coordinating investigators:
Monica Patrascu, Line Berge,
Zoya Sabir, Jutta Dierkes
Study director: Bettina Husebø

Background: Providing care and support for the steadily growing population of older adults with complex conditions (CC) is one of the key challenges of our society. Research has consistently shown that most older adults do not want to be institutionalised – they wish to live independently at home for as long as possible. In the coming years, the healthcare system will register a lack of professional healthcare workers to match future demands, which calls for a paradigm change. The Trond Mohn Research Foundation and the University of Bergen generously provided financial support to SEFAS to establish the Centre for Complex Conditions and Ageing (CC.AGE). Here, we investigate the use of novel technology and high-quality care to improve the lives of older adults with CC living at home.

The primary aim of CC.AGE is to improve the living situation for older adults with complex conditions to live safely and independently at home with a good quality of life, while supporting their relatives and municipal healthcare professionals. To achieve this, we aim to:

- design, implement, and test the efficacy of a research-based digital plug-and-play platform with a range of technologies integrated into a mobile tool for use at home.
- identify traditional care areas that can be safely replaced by digital support.
- determine specifications for integrating existing technologies and for developing new products that will be able to sustain 'plug-and-play' integration.
- contribute to the design and testing of a social living environment.

Design: CC.AGE employs major transdisciplinary collaboration between medicine, nutrition, systems science, artificial intelligence, software engineering, economy, and ethics that builds on existing evidence, user involvement, and methodological expertise. The approach encompasses 7 work packages (WPs) with contributions from industry, public partners, and scientific partners. The central activity will be a 12-week randomised controlled trial (RCT) to explore the effect and cost-effectiveness of a multicomponent intervention in home-dwelling people with complex conditions, preceded by a mixed-methods pilot.

Status: CC.AGE began its work on February 1st, 2024, and held its opening ceremony in the University Aula on October 1st, 2024. The project's vast reach and multidisciplinarity were highlighted through several insightful contributions from our national and international colleagues and collaborators. All activities in the work packages are directed toward the establishment of the RCT, estimated to begin in 2026.

CC.AGE began its work in 2024. In 2025, WP2 advanced GDPR-compliant recruitment procedures for the pilot and supported REK applications; WP3 received REK approvals for the Food Supply Study and the Hydration Assessment Study and initiated recruitment and content development; WP4 received REK approval for the sleep pilot and progressed digital interventions and exercise content; WP5 advanced the ALIVE platform with Phase 1 (manual mode) nearing completion and Phase 2 (fuzzy AI) under development, including data pipelines for devices such as Garmin Venu 3S and Somnofy. A mixed-methods pilot study will precede the RCT to evaluate feasibility, usability, and preliminary effectiveness. The RCT is estimated to begin in autumn 2026.

Funding

- The Trond Mohn Research Foundation
- The University of Bergen

Decoding Death and Dying in People with Dementia by Digital Thanotyping (5-D)

Disease: Dementia
Type of study: Observational trial


Coordinating Investigator: Monica Patrascu
Study Director: Bettina Husebø

Background: The 5-D project investigates how wearable and environmental sensors can help recognize symptoms and identify the dying phase in people with dementia. Dementia prevalence is expected to triple by 2050 in Europe, making improved end-of-life care increasingly important. People with advanced dementia often experience neuropsychiatric symptoms, including agitation, depression, anxiety, apathy, psychosis, and disturbances in sleep and appetite, alongside pain that is frequently underrecognized. Both under-- and over-treatment may worsen discomfort and reduce quality of life.

Nearly 40% of people with dementia die unexpectedly, and symptom changes near the end of life are often difficult to interpret due to communication challenges. By combining clinical assessments with sensor data, the 5-D project aims to deepen understanding of physical, behavioural, and oral health changes at the end of life and to develop tools that support more accurate and person-centred care.

Primary objective: The goal is to develop robust methods for diagnosing and describing the final phase of life in people with dementia. Insights from the project aim to improve individualized treatment and provide knowledge transferable to other scientific fields. A clearer understanding of how, why, and when people with dementia reach the last phase of life may support more personalized and compassionate palliative care for individuals who cannot express symptoms or pain.

Design: 5-D integrates clinical assessment tools with wearable devices to monitor pain, distressing symptoms, behavioural and psychological changes, and oral health status, while identifying the "point of no return" as the beginning of perceived dying. The Garmin Venu 3S tracks heart rate and activity, while the Somnofy radar monitors sleep patterns, movement, and indoor air quality. The project team spans clinicians, nurses, dental specialists, occupational therapists, engineers, data scientists, and neuroscientists. Complementary sub-studies include **DIPH.DEM,** investigating activity changes at the end of life; **ORAL.DEM,** examining oral health in the terminal phase; and the **Relative Interview Study,** exploring family perspectives on end-of-life symptoms.

Status: Ethical approvals have been obtained, and seventeen nursing homes across Bergen, Alver, Voss, Stad, Farsund, Bjørnafjorden, and Bærum are now participating. Regular information and education sessions are conducted in all centres. Over 200 participants have been recruited, with more than 170 completing baseline assessments. Follow-up data collection is ongoing, including six- and twelve-month measurements. Analyses now examine both individual symptoms and interdependencies between them.

Participating centres

Seventeen nursing homes in the municipalities of Bergen, Voss, Alver, Stad, Farsund, Bjørnafjorden, and Bærum, Norway

Funding

- The European Research Council (ERC)
- The University of Bergen
- The Regional Health Authorities (Helse Vest)

Digital Phenotyping for Changes in Activity at the End of Life in People with Dementia (DIPH.DEM)

Disease: Dementia
Type of study: Observational trial



Coordinating Investigator: Lydia D. Boyle
Study Directors: Bettina S. Husebø & Monica Patrascu

Background: Almost 90% of people with dementia develop behavioural and psychological symptoms (BPSD), and recent research shows that mapping physical, social, and mental activity patterns may serve as markers of clinical states, including BPSD. Digital phenotyping - drawing insights from passive sensing data - remains largely unexplored in dementia research, particularly in the final phase of life. This study explores whether sensor-based measures can offer more objective insight into activity changes and end-of-life symptom trajectories.

The primary objective of the study is to evaluate physical activity levels and behavioural symptoms of people with dementia living in the nursing home, focusing on restlessness, pain, and sleep challenges. By combining sensor-based digital measures with validated assessment tools, the study aims to describe the activity trajectory toward the end of life. As a cornerstone of the 5-D project, DIPH.DEM will contribute to modelling activity changes associated with agitation, apathy, sleep disturbances, and activities of daily living (ADL).

Design: DIPH.DEM is a one-year observational study recruiting nursing home residents aged >64 years with possible or confirmed dementia and no delirium. Data collection involves 7-day periods repeated every six months for up to one year, supported by proxy-rated questionnaires. The study uses the Garmin Vivoactive 5 (physical activity, movement) and the Somnofy contactless radar (sleep quality, movement, and environmental conditions). All sensor data are stored securely using the University of Bergen infrastructure.

Analyses will investigate daily activity patterns and symptom changes across time and are intended to inform a digital phenotype model addressing key behavioural disturbances in advanced dementia.

Primary endpoint: Change in activities of daily living (ADL) over the data collection period and estimation of activity changes and selected behavioural disturbances based on combined digital phenotype modelling.

Status: The study began in May 2023 with REK approval received in October 2023. Data collection was completed in May 2025, and the research team is now analysing the year-long dataset. The first publication, examining associations between daytime physical activity and sleep quality in nursing home residents with dementia, was published in *Sensors* (October 2025; doi: 10.3390/s25216635). Two additional papers are expected in spring 2026.

The study will conclude in autumn 2026, with further work planned on psychotropic use related to sleep disturbances and long-term use of sensing technologies in dementia care.

Participating centres

- Bergen Red Cross Nursing Home, Bergen, Norway
- Haraldsplass Deaconess Hospital, Bergen, Norway

Funding

- The Regional Health Authority of Western Norway
- The Norwegian Research Council (Neuro-SysMed)

Oral Care at the End of Life in People with Dementia (ORAL.DEM)

Disease: Dementia
Type of study: Observational trial

Coordinating Investigator: Manal Mustafa
Study Director: Bettina S. Husebø

Background: Caring for people with advanced dementia presents unique challenges, particularly in recognizing when they are approaching the end of life. The Lancet Commission on *the Value of Death* highlights the importance of timely identification to enable effective end-of-life planning and care. Despite the significance of this phase, oral health is often overlooked in dementia care.

People with dementia frequently struggle with basic oral hygiene due to memory loss and reduced motor skills. This leads to poor oral hygiene, unhealthy dietary habits, and a high prevalence of oral problems, including caries and periodontal lesions. These issues contribute to discomfort, malnutrition, and declining overall health. Incorporating oral health into palliative care helps identify ways to improve patient outcomes and better understand the full scope of needs in this vulnerable population. ORAL.DEM is conducted in collaboration with Haraldsplass Deaconess Hospital, SEFAS, and the Department of Clinical Dentistry at the University of Bergen and informs the larger 5-D project.

Primary objective: ORAL.DEM aims to develop a state-of-the-art method to assess oral health symptoms in people with dementia during the last period of life. The study will establish an advanced framework for evaluating oral health status, detecting microbial profile changes, and assessing imbalances in inflammatory and resolution molecules.

Design: ORAL.DEM recruits older adults (≥65 years) with dementia from nursing homes. Clinical assessments are conducted every six months to evaluate oral mucosa, gingival tissue, saliva levels, and lesions such as caries and gingivitis. Caries assessments follow WHO guidelines. Unstimulated saliva samples are collected at baseline and follow-up visits to measure salivary pH and buffering capacity. Plaque samples are analysed using the Human Oral Microbial Identification Microarray (HOMIM), and gingival crevicular fluid (GCF) is collected for later molecular analyses.

The study follows a prevention strategy that includes supporting nursing home staff to help prevent oral disease, ensuring early detection and follow-up of emerging lesions, and referring residents for treatment when needed to reduce pain, impairment, and discomfort.

Status: ORAL.DEM, as part of the 5-D project, has been approved by the National Ethics Committee (NEM nr 2023/166). Informed consent is obtained from all participants, ensuring anonymity, confidentiality, and voluntary participation. Interobserver reliability procedures were completed prior to data collection in collaboration with the Department of Clinical Dentistry to ensure high data quality. Data collection began in November 2024. By January 2026, a total of 120 participants had been enrolled at baseline across seven participating nursing homes. The first follow-up phase, initiated in June 2025, included 75 participants, and the second follow-up is scheduled to begin at the end of January 2026. Preliminary results were presented during the 5-D Day to collaborating nursing home staff.

Participating centres

- 10 nursing homes in the Bergen area, Norway

Funding

- The Regional Health Authority of Western Norway

The ActiveAgeing Study – the Helgetun Branch

Disease: Across all four diseases
Type of study: Observational trial


Coordinating Investigator: Elise Førsund
Study Director: Bettina S. Husebø

Background: Chronic complex conditions, including age-related neurological diseases, pose one of the greatest challenges facing science and society. Demographic studies show that patient numbers will continue to grow, and older adults with complex conditions are increasingly posing major challenges to healthcare provision in the 21st century. Care today is very costly, and loneliness is a threat. Self-management and independence should exist alongside social activities and healthcare services. The Care Node wishes to explore and use novel technology and smart buildings to innovate care and treatment for the elderly through sustainable business models, and look at how we can implement new scientific knowledge into action more effectively and efficiently. One such pilot project is Helgetun, built and financed by the GC Rieber Foundations. Helgetun is a senior community-based living environment located in a rural area of Bergen. It aims to promote active ageing by facilitating mental, social, and physical participation. It consists of 31 rental apartments and several shared facilities. At Helgetun, residents can join a variety of activities and gatherings, as well as volunteer at the nearby farm and kindergarten.

The primary objective is to evaluate how this way of living can reduce loneliness and potentially delay the development of complex chronic conditions, allowing people to live longer independently at home. Based on observations, interviews, and sensor data from wearable devices, we are investigating how living at Helgetun affects the lives of the residents.

Design: This branch of the ActiveAgeing project primarily uses a qualitative research approach, consisting of interview data from 15 residents (11 female, 4 male, ages 62-84) from Helgetun. Additionally, the project is collecting sensor data from wearable devices (Empatica E4, FitBit Sense, Oura Ring) to investigate adaptation and implementation of smart technology for older adults. Sensor data is collected over two sessions, each for 2 weeks continuously, for each participant.

Status: The study was initiated in spring 2021, and all data were collected during 2021/2022. Three scientific publications have been produced, forming the doctoral thesis of Elise Førsund, submitted in autumn 2025.

The first article was published in *Frontiers in Public Health* in April 2024, identifying three key factors supporting active ageing at Helgetun: maintaining self-identity, experiencing growth and development, and feeling a sense of belonging. The second article, published in the *Journal of Aging and Environment* in June 2025, examined residents' relocation stories using a narrative approach. A third article, currently under review, focuses on technology adoption among older adults based on interviews and sensor data collected at two timepoints.

Participating centre

- Helgetun Living-Lab, Bergen, Norway

Funding

- The GC Rieber Foundation
- The University of Bergen
- The Research Council of Norway

The ActiveAgeing Study – the DIGI.PARK Branch

Disease: Parkinson's disease
Type of study: Observational trial




Coordinating Investigators:
Haakon Reithe & Monica Patrascu
Study Directors:
Bettina Husebø & Charalampos Tzoulis

Background: Current tools for assessing clinical phenotype and severity in Parkinson's disease (PD) are based on observation while the patient performs a series of tasks. Most established is the Unifying PD Rating Scale (UPDRS), which is considered the gold standard for assessing the efficacy of clinical trials testing symptomatic and neuroprotective agents. Meanwhile, these tools are limited by a lack of objectivity, low sensitivity and reproducibility, and vast variation depending on the time of the examination, time of the last received dose of dopaminergic treatment, etc. One approach to circumvent these limitations and establish more objective measures of severity is that of digital phenotyping via the use of wearable sensors.

The primary objective of the DIGItal phenotyping in people with PARKinson's disease (DIGI.PARK) study is to assess the use of wearables for symptom tracking in home-dwelling people with Parkinson's disease.

Design: This branch of the ActiveAgeing project is an observational study comprised of two phases. During the first phase, data is collected from people with Parkinson's disease (n=14) and older adults (n=15) residing at Helgetun, Bergen, Norway. A 2-week data collection is conducted in the participants' home, employing clinical assessment tools (cognitive assessment, Parkinsonian symptomology, sleep disturbances), two smart watches (Fitbit Sense and Empatica E4), and a smart ring (Oura).

The first phase of data analysis involves a cross-evaluation between the three devices and their output, including comparisons with self-reported diary logs. The second phase of the study is based on the results of the first phase, as the data collection procedure is refined according to the first-phase data analysis. The second phase involves data collection from persons with Parkinson's disease and their spouses, to compare the crossover effects of the disease. Both phases include the design of specific Parkinson's disease digital biomarkers for symptom tracking.

Status: The first phase of DIGI.PARK began in spring 2021, with all data collected in 2021/2022. Analysis of the three wearable devices has been completed, resulting in digital biomarkers for tremor quantification and physical activity response. A second study is under development and will start in the first half of 2026.

Reithe's second paper has been accepted, presenting a tremor-quantification algorithm (3–12 Hz) developed with Monica Patrascu and Brice Marty. The algorithm generates a tremor index (TI) that distinguishes between more and less affected hands and shows promise for tracking tremor in daily life, pending validation in larger samples.

A third paper, to be published in early 2026, proposes biomarkers for medication response and ON/OFF fluctuations using the TI. Early findings show individual variation in treatment effects and good correspondence with clinically reported ON/OFF states.

The newest PhD candidate, Shakil Rajan Salim, is preparing his first paper using DIGI.PARK Phase one data. His PhD will be based on the second study, involving 110 participants using the Axivity AX6 device to evaluate medication response and compensatory motor patterns in comparison with controls.

Participating centre

- Helgetun Living-Lab, Bergen, Norway

Funding

- The University of Bergen
- The GC Rieber Foundation
- The Research Council of Norway, Neuro-SysMed
- The Regional Health Authority of Western Norway

Virtual Darkness and Digital Phenotyping in Specialised and Municipal Dementia Care (DARK.DEM)

Disease: Dementia
Type of study: Randomized controlled trial



Coordinating Investigator: Line Iden Berge
Collaborators: Elisabeth Flo-Groeneboom & Tone E. G. Henriksen

Background: Behavioural and psychological symptoms of dementia (BPSD), including agitation, psychosis, anxiety, and depression, are common, often treatment-resistant, and associated with reduced cognition, functioning, and quality of life. Assessment traditionally relies on retrospective proxy ratings, which suffer from low reliability. Digital phenotyping, using continuous data from wearable devices, offers more objective and sensitive behavioural measures.

Disturbed circadian rhythms also contribute to BPSD. Intrinsically photosensitive retinal ganglion cells (ipRGCs), most sensitive to blue light, regulate day–night perception. This understanding has led to the development of virtual darkness therapy, where exposure to blue-deprived light in the evening and night may stabilise circadian rhythms and reduce agitation. The DARK.DEM project evaluates both digital phenotyping and virtual darkness therapy and investigates how such interventions can be implemented in specialised and municipal dementia care.

The primary objective: To develop and evaluate digital phenotyping and virtual darkness therapy to enhance BPSD management in specialised dementia care and facilitate implementation in municipal dementia care.

Design: The project includes three work packages:

WP1 – DIG.DEM: At NKS Olaviken Gerontopsychiatric Hospital, 8–10 participants undergo 24-hour assessments of agitation, depression, and sleep using established scales correlated with data from wearable devices (Empatica Embrace, GENEactiv, Somnofy). Signal-processing methods will be used to develop digital biomarkers of agitation, depression, and sleep disturbances.

WP2 – DARK.DEM RCT: 72 inpatients at NKS Olaviken Gerontopsychiatric Hospital with dementia and agitation (CMAI ≥45) will be randomised to either treatment as usual or 14 days of virtual darkness (blue-light-deprived lighting from 18:00–08:00) delivered through a circadian lighting system. Primary outcome is change in CMAI score; secondary outcomes include changes in NPI-12, CSDD, QoL, ADL, use of psychotropic medication and restraints, and length of stay.

WP3 – DECIDE.DEM: Focus group interviews with staff in specialised and municipal care to examine feasibility, barriers, and enablers for implementation.

Primary endpoint: Change in agitation assessed with CMAI from baseline to day 14.

Status: The study began in August 2023 and has recruited two PhD candidates, one postdoc, and a research nurse. Ethical approvals, DPIA, and trial registrations are completed, and information materials have been prepared. Recruitment is ongoing, and procedures, including the virtual darkness intervention, are well received by staff and participants. 15 participants have been enrolled in the RCT, with 13 completing the intervention; preliminary findings were presented at an international conference. Patients show varied engagement with study equipment, including a strong interest in the wearable devices and continued use of orange glasses after the intervention.

Parallel recruitment for the DIG.DEM work package is underway, with 9 out of the planned 10 participants included. Early analyses indicate promising circadian patterns in wearable-derived data. Preliminary results have been presented at the Neuro-SysMed Annual Symposium and the Technology in Psychiatry Summit. The project aims to reach full RCT inclusion (72 participants) by the end of 2026.

Participating centre

- NKS Olaviken Gerontopsychiatric Hospital, Bergen, Norway

Funding

- The Research Council of Norway
- The University of Bergen

MINI BIOGRAPHIES OF PHD CANDIDATES AND POSTDOCS

An ambitious scientific team, comprised of researchers with differing backgrounds, is the driving force behind Neuro-SysMed's activity. An important mission of Neuro-SysMed is to provide a strong support system for our up-and-coming researchers and to recruit talents from all over the world. We here show mini biographies of current (2025) PhD candidates and postdocs affiliated to Neuro-SysMed's nodes, in alphabetical order.

SHAMUNDEESWARI ANANDAN (Postdoc)

Anandan has her PhD from the University of Bergen and is currently pursuing a postdoctoral research project within the MS Node under the mentorship of Prof. Myhr and Prof. Torkildsen. Her projects aim to identify unique brain-derived extracellular vesicles circulating in blood and to unlock their biomarker potential to improve the current understanding of the underlying central nervous system pathogenesis. Anandan has been the coordinator of the Junior Scientist Symposium in the Neuro-SysMed Research School and is currently the Norwegian Extracellular Vesicles Society (NOR-EV) Associate Board Member and acting NOR-EV National Ambassador at the International Society of Extracellular Vesicles.

BIRGITTE BERENTSEN (Postdoc)

Berentsen has a PhD in neuroscience and is currently a postdoc at Neuro-SysMed in the PD Node. She is also the head of the Bergen BrainGut Research Group, University of Bergen, and head of section for digital treatment in IBS (Mage-tarmskolen), Department of Internal Medicine, Haukeland University Hospital. She currently supervises three PhD students, two medical students, and three master's students. Her main research interests are disturbances of the gut-brain axis and gut-first PD. Through clinical data and histological and molecular analyses of the intestinal wall, Berentsen investigates prodromal, preclinical, and clinical PD pathology of the gut.

LISA AASLESTAD (PhD Candidate)

Aaslestad completed her Master's in 2024 at the UiB/SEFAS with the thesis "Bridging Gaps: Wearable sensing-driven assessment of REM sleep behavior disorder in Parkinson's Disease. Results from the DIGI.PARK study." She is currently a PhD candidate at SEFAS, working with the Centre for Complex Conditions and Ageing (CC.AGE). In her PhD project "Digital Interventions for Sleep and Physical Activity in Older Adults with Complex Conditions," she is working on developing a digital solution aimed at enhancing sleep, with the goal of improving activity levels and the overall quality of life among older adults.

HAAKON BERVEN (PhD Candidate)

Berven has an MD degree from the University of Southern Denmark and an MS in bioinformatics and computational biology from Newcastle University. He is currently a PhD candidate in the PD Node at Neuro-SysMed. He has recently conducted the NR-SAFE trial, investigating the safety of high-dose Nicotinamide Riboside (NR) treatment in PD, and the N-DOSE trial, investigating the biological response to increasing doses of NR in PD. He is currently the local site principal and coordinating investigator of the D-SPARK trial, assessing the effect of D-Serine supplementation on disease progression in Parkinson's disease.

TALE LITLERE BJERKNES (Postdoc)

Bjerknes has an MD from the Norwegian University of Science and Technology and a PhD from the Kavli Institute for Systems Neuroscience, where she worked on a project focusing on the development of spatial representation and memory. She is currently a resident at the Department of Neurology, Haukeland University Hospital, and co-leads the ALS Node at Neuro-SysMed. Her research project aims to elucidate the role of mitochondrial dysfunction in amyotrophic lateral sclerosis (ALS) by stratifying ALS patients based on changes in the mitochondrial respiratory chain in neurons and associated alterations in mitochondrial DNA. She also investigates various aspects of quality of life in ALS patients, their partners, and children, including the impact of life-prolonging treatment with long-term mechanical ventilation.

LYDIA D. BOYLE (PhD Candidate)

Boyle has an M.Phil in global health studies from the University of Bergen and a Doctor of Physical Therapy (DPT) from the University of Texas Medical Branch. Lydia is currently a PhD candidate at SEFAS. Her project, funded by Helse Vest and in partnership with Neuro-SysMed, investigates the use of digital biomarkers from sensing technologies for the detection of changes in sleep behaviours and physical activity levels for people with dementia residing in a nursing home (DIPH.DEM).

BRAGE BRAKEDAL (Postdoc)

Brakedal, PhD, MD, B.Sc., is working as a postdoc and consultant at the department of Neurology at Haukeland University Hospital. The PhD was defended in 2022 and focused on epidemiology and disease-modifying drugs in Parkinson`s disease using the Norwegian prescription database. Current focus in the postdoc is clinical trials in Parkinson`s disease with coordinating supervision of the NOPARK study, a national multicenter randomized double-blinded disease-modifying phase 3 trial. The postdoc is ongoing until July 2026.

VALENTINA CASADEI (Postdoc)

Casadei is an engineer and PhD who received her master's degree in biomedical engineering from the Università Politecnica delle Marche (Italy), and her doctorate from the University of Liverpool (UK), specializing in wearable signal processing and measurement uncertainty quantification. She is currently a postdoc at SEFAS, working on digital phenotyping for behaviours and psychological symptoms of dementia (BPSD) in the DARK.DEM study. She recently started as a Researcher for the IsoRhythm team as part of the SOLIS100 study funded by the European Space Agency (ESA). She has been a member of the Institute of Electrical and Electronics Engineers (IEEE) since 2018, serves as a reviewer for the IEEE Instrumentation and Measurement Society, and is Vice-Chair for the IEEE EMBS Norway Section Chapter.

KARINE EID (Postdoc)

Eid has her MD degree from the Norwegian University of Science and Technology (Trondheim). She completed her PhD in the Neuro-SysMed MS Node and Bergen Brain Research Group in 2024, and is currently a postdoc on a project that will study migraine in the prodromal phase of MS. She is a Visiting Scholar at the Harvard T.H. Chan School of Public Health during the 2025–2026 academic year. There, she is working on a project examining how physical activity affects the risk of Parkinson's disease among individuals with REM sleep behaviour disorder, using data from the Nurses' Health Study and the Health Professionals Follow-up Study.

ANNELISE ELDE (PhD Candidate)

Elde is a trained clinical nutritionist from the University of Bergen. In March 2025, she started as a PhD candidate in the CC.AGE project at SEFAS. The goal of CC.AGE is to facilitate safe and independent aging at home for people with complex diseases. Annelise's PhD project will focus on nutrition among older people with complex diseases.

ELISE FØRSUND (PhD Candidate)

Førsund is a molecular biologist and has an MS on the correlation between aging cells and Parkinson's disease. She is currently working on her PhD on the "ActiveAgeing" project, Helgetun branch. Her PhD is qualitative and focuses on new living environments for older adults and the implementation of smart technology for this age group. In addition, she is contributing to the CC.AGE project on the Ethics work package. She has a background as a civil engineer and molecular biologist, where she, in her master's, looked at the correlation between the lipid composition of aging neurons and the development of Parkinson's disease.

GLORIA GAMIZ (Postdoc)

Gamiz did her PhD at the University of Granada in 2022, where she specialised in exploring the principles determining protein stability, folding kinetics, and structure. Currently, she is a postdoc in the Martinez lab in the Drug Discovery Node, where her research is focused on studying the molecular homeostasis of tyrosine hydroxylase. This work aims to develop novel therapies to address conditions associated with dysregulation of dopamine synthesis.

SYNNE GEITHUS (PhD Candidate)

Geithus has an MSc in molecular medicine from NTNU, Trondheim. She is currently a PhD candidate in the PD Node, affiliated with the K.G. Jebsen Centre for Parkinson's disease, with Gonzalo Sanchez Nido as the main supervisor. Her thesis focuses on the bioinformatic approach to stratify PD using transcriptomics data.

ANDREA KYVIK HABBESTAD (PhD Candidate)

Habbestad has her MD degree from the University of Bergen (2022). She is currently a resident in neurology at the Department of Neurology at Haukeland University Hospital and a PhD candidate in the MS node with Professor Torkildsen as main supervisor, focusing on the link between the Epstein-Barr virus and MS.

JOHANNE THOEN HANSEN (PhD Candidate)

Hansen has an MSc in economics from the Norwegian School of Economics (NHH). Johanne is accepted as an industrial PhD candidate with funding from the Research Council of Norway. Her work will explore the societal costs and burden of disease of MS in Norway, using individual-level data from public health registries, welfare registries, other public registries, and the MS registry. The work is supervised by Stig Wergeland and Øivind Torkildsen from UiB and the Neuro-SysMed group, and Christoffer Bugge, partner in Oslo Economics, as the industry supervisor.

ANNE THERESE HATLE (PhD candidate)

Hatle is an occupational therapist with a master's degree in evidence- based practice in health sciences. Since 2022, Anne Therese has been a lecturer in the occupational therapy bachelor's program at Western Norway University of Applied Sciences. In April 2024, she started as a doctoral candidate at SEFAS. Her research focuses on Decoding Death and Dying in people with Dementia by Digital thanotyping (5-D) to precisely investigate the end of life in nursing home patients with dementia utilizing digital technology. Within this project, her specific area of focus is agitation.

JUSTIN HAUGLAND-PRUITT (PhD Candidate)

Haugland-Pruitt has an M.Phil in Global Health from the UiB. During his master's, he explored the experiences and perceptions of medical overuse among migrant health professionals in Norway. Justin is currently a PhD candidate at SEFAS on the CC.AGE project and working closely with BCEPS. He will be studying the ethical and regulatory challenges surrounding assistive technologies, algorithms, and AI in research involving older adults with dementia. He is currently conducting a qualitative interview study exploring the acceptability and ethical considerations of family members of adults with dementia in nursing homes participating in the 5-D project.

KAMILLA HAUGLAND-PRUITT (Postdoc)

Haugland-Pruitt holds a PhD in Neuroscience from the Arctic University of Norway (UiT). She is currently a postdoctoral researcher at SEFAS, working on the 5-D project, which explores death and dying in people with dementia. Her research primarily focuses on sleep disturbances across varying degrees of cognitive decline, and she also contributes to investigations of agitation and pain within the project. Kamilla is actively involved in data collection, statistical analysis, and supervision of PhD and medical students. She regularly presents findings at national and international conferences and engages with nursing homes and relatives to disseminate knowledge about the 5-D project. In addition to her research activities, Kamilla serves as a postdoctoral representative for the IGS research schools and the Faculty of Medicine and is a participant in the Momentum program (2025–2026).

FARZANA HAQUE (PhD Candidate)

Haque holds a Bachelor of Dental Surgery from the University of Dhaka and a Master's in Dentistry from University Sains Malaysia (USM). She is currently pursuing her PhD at SEFAS within the ORAL.DEM project, which is part of the European Research Council (ERC) funded research initiative Decoding Death and Dying in People with Dementia by Digital Thanotyping (5-D). Her research focuses on investigating oral health among individuals with dementia in the end-of-life phase. Through clinical examinations and biological sample collection, she helps generate evidence that can guide better oral care for people living with dementia.

EIRIN HILLESTAD (PhD Candidate)

Hillestad holds an MPhil in Media Studies from the University of Bergen and has completed continuing education in counselling at VID Specialized University. She is currently a PhD candidate at SEFAS, researching volunteer support for older community-dwelling people living with dementia. Her project involves interviewing volunteers, volunteer coordinators, individuals with dementia, and their relatives, as well as conducting participant observations. Eirin works at the Dignity Centre as a Specialist and Research Developer.

ODA SUNNIVA AESCHLIMANN ISENE (PhD Candidate)

Isene has a master's degree in Cognitive Neuroscience from the University of Oslo. In September 2025, Oda started as a PhD candidate at SEFAS. Her research is part of the 5-D project (Decoding Death and Dying in People with Dementia by Digital Thanotyping), with a focus on the usage of digital sensors for pain assessment in people with dementia.

GARD AASMUND SKULSTAD JOHANSON (PhD Candidate)

Johanson holds an MD from the University of Bergen in 2022 and is currently a PhD candidate in the PD Node. His focus is on atypical parkinsonisms and especially progressive supranuclear palsy (PSP), where he focuses on elucidating the role of mitochondrial dysfunction in the pathogenesis of PSP. He is also coordinating the NADAPT multicentre clinical trial, studying NAD-replenishment therapy in atypical Parkinsonism.

OLENA KONDRATSKA (Postdoc)

Kondratska holds a PhD in Biophysics. She has been working on the characterization of excitability profile and synaptic connections of neurons in human iPSC-derived 3D cortical organoid models, which underlie neuronal network alterations in patients with schizophrenia and bipolar disorder, neuronal network plasticity, and recovery mechanisms in the spinal cord following injury in mouse models. Her current research focuses on identifying early cellular and molecular changes in dopaminergic neurons in mouse models of Parkinson's disease.

TROND-ANDRÉ KRÅKENES (PhD Candidate)

Kråkenes has an MSc in nanoscience from the University of Bergen. He is since 2023 a PhD candidate in the Martinez group/Drug Discovery Node. His PhD project is focused on three presynaptic proteins: α-synuclein, TH, and VMAT2. The project aims to better understand the role of these proteins in the regulation of dopamine homeostasis and in PD.

SIMON ULVENES KVERNENG (Postdoc)

Kverneng holds an MD from the University of Bergen. In 2025, he completed his PhD with the thesis "Exploring clinical biomarkers of mitochondrial dysfunction in Parkinson's disease." Following his PhD, he was awarded a postdoctoral research fellowship from Helse Vest and serves as the principal investigator of the SLEIPNIR platform trial. He is also the coordinating investigator for the STRAT-PARK study.

PEDER LILLEBOSTAD (PhD Candidate)

Lillebostad holds an MSc in biomedicine from the University of Bergen, specializing in fMRI and brain connectivity. In 2025, he was a PhD candidate at Neuro-SysMed in the PD Node, working on imaging biomarkers, especially image segmentation in neuromelanin MRI. He is currently completing his PhD work.

KATARINA LUNDERVOLD (PhD Candidate)

Lundervold holds an MD specializing in neurology at the Haukeland University Hospital and is currently a PhD candidate in the PD Node at Neuro-SysMed. Her PhD research focuses on the brain-gut axis in neurodegenerative disorders and NAD replenishment therapy in PD, frailty, and sleep.

KJERSTI NEDRESKÅR (PhD Candidate)

Nedreskår holds a Cand. Psychol. from the University of Oslo and a bachelor's degree in cell and molecular biology from NTNU. She has seven years of experience as a clinical psychologist and is currently doing her PhD at SEFAS on the DARK.DEM project. Her doctoral work is qualitative, using a hermeneutic approach to study the incorporation of circadian lights in dementia care.

HILDE NORDBORG (PhD Candidate)

Norborg has her MD degree from the University of Bergen (2017) and is currently a PhD candidate in the MS Node, focusing on disease-modifying therapies in multiple sclerosis.

SHIVAM PANDEY (PhD Candidate)

Pandey holds a bachelor's and master's degree in computer science with a specialization in Machine Learning, Fuzzy Systems, and Data Mining. After completing his master's, he worked as an ad-hoc lecturer for the course Computer Operator and Programming Assistant (COPA) at the Industrial Training Institute, India, and later served as a Data Scientist at Amazon India. He joined SEFAS in March 2025 and is currently a PhD candidate within the CC.AGE project. His research focuses on developing a nested fuzzy rule-based AI model integrated into the ALIVE digital health platform, designed to promote healthier and more independent lifestyles for older adults living at home.

SHAKIL RAJAN (PhD Candidate)

Rajan holds an M.Phil. in International Community Health from the University of Oslo. During his master's program, he focused on sociodemographic and health-related factors associated with COVID-19 vaccine hesitancy. Currently, Shakil is a PhD Candidate at SEFAS, affiliated with the DIGI.PARK project (Digital Phenotyping in People with Parkinson's Disease). His research centres on developing digital tools for health monitoring using AI-based smart sensor devices, with the aim of improving the overall health and quality of life for older adults.

HAAKON REITHE (PhD Candidate)

Reithe has a background in psychology and neuroscience, where he developed a keen interest in the measurement of human physiology and cognition. He is currently a PhD candidate in the ActiveAgeing study, working on the DIGI. PARK branch. There, he is mainly focusing on cross-evaluating devices for Parkinson's research and clinical use and testing a SEFAS-developed algorithm which quantifies the energy of tremors in ranges 3 to 12 Hz, including testing and validating the algorithm by comparing TI pre and post medication.

ANNA RUBIOLO (PhD Candidate)

Rubiolo has an MSc in Neuroscience from the University of Trieste and Helsinki. Currently, she is a PhD candidate in the PD Node and affiliated with the KG Jebsen Center for Parkinson's Disease. Her research is focused on confirming the existence of subtypes of idiopathic PD based on mitochondrial dysfunction, specifically related to respiratory complex I deficiency.

BRIT ELLEN RØD (Postdoc)

Rød has her MD degree from the University of Bergen and has been working as a resident in neurology at the Department of Neurology, Haukeland University Hospital. She completed her PhD in June 2025 and is currently a postdoc in the MS Node, focusing on anti-CD20 monoclonal antibodies and Epstein-Barr virus in patients with multiple sclerosis.

STINE SCHIKORA-RUSTAD (PhD Candidate)

Schikora-Rustad is an MD and neurologist at the Department of Neurology, Sørlandet Hospital, Kristiansand, Norway. She is also currently a PhD candidate associated to the MS Node. Her PhD research is focused on haematopoietic stem cell transplantation in multiple sclerosis patients, with Torkildsen as co-supervisor.

LIV MARIE RØNHOVDE (PhD Candidate)

Rønhovde has an MSc in Clinical Psychology (Cand. Psychol.) from St. Olavs Hospital and The Norwegian University of Science and Technology, Trondheim. She is currently a PhD candidate associated to the MS Node, working on the NORSE MS project. Her PhD research is focused on cognitive behavioural therapy for insomnia in multiple sclerosis, with Bø as co-supervisor.

TROND TRÆTTENBERG SERKLAND (PhD Candidate)

Serkland has his MD degree from the University of Bergen, and is currently a senior consultant in clinical pharmacology, and a PhD candidate associated to the MS Node. The objective of his project is to clarify whether clinical pharmacological tools can contribute to useful decision support in the establishment of personalised treatment of multiple sclerosis with monoclonal antibodies against CD20-positive B-cells.

ZOYA SABIR (Postdoc)

Sabir holds an MS and a PhD in Clinical Nutrition from the University of Bergen. In her PhD project, she investigated associations of dietary patterns and protein intake with muscle mass and strength in community- dwelling older adults. She is currently a postdoctoral fellow at the Centre for Elderly and Nursing Home Medicine (SEFAS), working on the CC.AGE project. Her work within CC.AGE will mainly focus on food environments, hydration, and nutritional status in older adults with chronic complex conditions. This will include an evaluation of digital methods for assessment of dietary intake and hydration status, with the goal of protecting older adults from nutritional deficiencies and dehydration.

SUNNIVA VIBE SKAGEN (PhD Candidate)

Skagen holds an MS in psychology from 2023 with a specialization in behavioural neuroscience. Her thesis, titled “An Exploration of the Effects of tDCS on the Supplementary Motor Complex and its Impact on Inhibitory Control: Implications for Tourette’s Syndrome,” investigated the effects of transcranial direct current stimulation (tDCS) on inhibitory control. Currently, Sunniva is working as a PhD candidate at SEFAS, specifically with the DARK.DEM study, which investigates the potential therapeutic benefits of darkness therapy for reducing agitation in individuals with dementia.

MAGNE HAUGLAND SOLHEIM (PhD Candidate)

Solheim holds an MSc in statistics and is a chief engineer in the Core Facility for Biostatistics and Data Analysis at UiB. Currently, he is also a part-time PhD candidate in the DRONE project/the Drug Discovery Node, where he uses health registries to study amyotrophic lateral sclerosis.

KJERSTI STIGE (PhD Candidate)

Stige holds an MD from the University of Tromsø. Currently, she is a PhD student at the Norwegian University of Science and Technology (NTNU) and works as a neurology resident at St. Olav's University Hospital. She has a particular interest in movement disorders and currently focuses on the Neuro-SysMed STRAT-PARK study in the PD Node.

MAGNUS SVENSEN (PhD Candidate)

Svensen completed an MSc in analytical chemistry at the University of Bergen (2022) and is currently a PhD candidate in the PD Node. His project focuses on the usage of phosphorus-based magnetic resonance spectroscopy (31P-MRS) to find potential biomarkers for diagnosis, stratification, and treatment response in Parkinson's, Alzheimer's, and ALS.

KRISTIN EIDSHEIM SØNNESYN (PhD Candidate)

Sønnesyn holds an MD from the University of Bergen (2015). She is a resident in geriatrics at the Department of Medicine at Haraldsplass Deaconess Hospital and a PhD candidate in the Dementia Node at Neuro-SysMed. Her PhD project focuses on the prodromal phase of dementia with Lewy bodies.

MARY DAYNE SIA TAI (PhD Candidate)

Tai holds an MSc in Biomedical Science from the University of Bergen. She was a PhD student at the Martinez group/the Drug Discovery Node at Neuro-SysMed until October 2025, when she successfully defended her thesis "Protein homeostasis as a therapeutic target for dopamine deficiencies and hyperphenylalaninemia." Her research showed how the co-chaperone DNAJC12 stabilizes its clients while preserving enzyme activity, shedding light on the mechanisms behind pathogenic DNAJC12 variants. Her work also highlights therapeutic potential, including the identification of an FDA-approved drug as a candidate compound that may be repurposed for the treatment of dopamine deficiencies. Currently, Mary Dayne is a postdoctoral fellow at the Centro Nacional de Biotecnología (CNB-CSIC) in Madrid, Spain.

IRIT TITLESTAD (PhD Candidate)

Titlestad holds an MSc in clinical diabetes nursing from the Western Norway University of Applied Sciences and was in 2025 a PhD candidate in the Neuro-SysMed Dementia Node. Her PhD project focuses on blood and cerebrospinal fluid (CSF) biomarkers that can identify patients with increased risk for delirium. In addition, the project aims to validate the diagnosis of delirium in a large biobank study on community-dwelling older adults. She is currently completing her PhD work.

HILDE MARIE TORGAUTEN (PhD Candidate)

Torgauten holds an MD from the University of Oslo (2012) and has been working as a resident in neurology at the Department of Neurology, Haukeland University Hospital. She is currently a PhD candidate in the MS Node, focusing on rituximab therapy and vaccination in MS patients.

ASMAT ULLAH (Postdoc)

Ullah holds a PhD in Engineering from NTNU, Trondheim. In his doctoral research, he developed AI and data-driven solutions for optimizing productivity and reducing emissions in sustainable construction machinery. He is currently a postdoctoral fellow at SEFAS, working on the CC.AGE project. His work within CC.AGE focuses on developing digital health technologies to support independent living for older adults with complex conditions. This includes creating AI-powered monitoring systems to detect health deterioration early, with the goal of preventing complications and reducing hospitalizations.

AMY VAN DER HOOVEN (PhD Candidate)

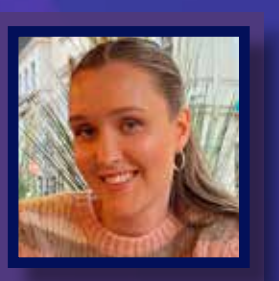
Van der Hooven holds a master's in design from 2019, UiB, with the project Re-imagining Pain Communication. She is currently a PhD candidate in the Faculty of Art, Music and Design, UiB, with the project Clinic of the Future: Designing Dialogues for Care. Her work explores how artistic approaches can transform communication in medical settings. She aims to collectively reimagine the clinic as a place where people feel seen, heard, and understood. Amy collaborates with the Bergen MS Research Group and participants from the MS Society in Bergen.

JOHANNES WILLUMSEN (PhD Candidate)

Willumsen, MD, is a consultant neurologist at the Department of Neurology, Møre and Romsdal Hospital Trust, Molde, Norway. He is currently a PhD candidate associated to the MS Node. His PhD research is focused on epidemiology and life expectancy in multiple sclerosis patients, with Myhr as co-supervisor.

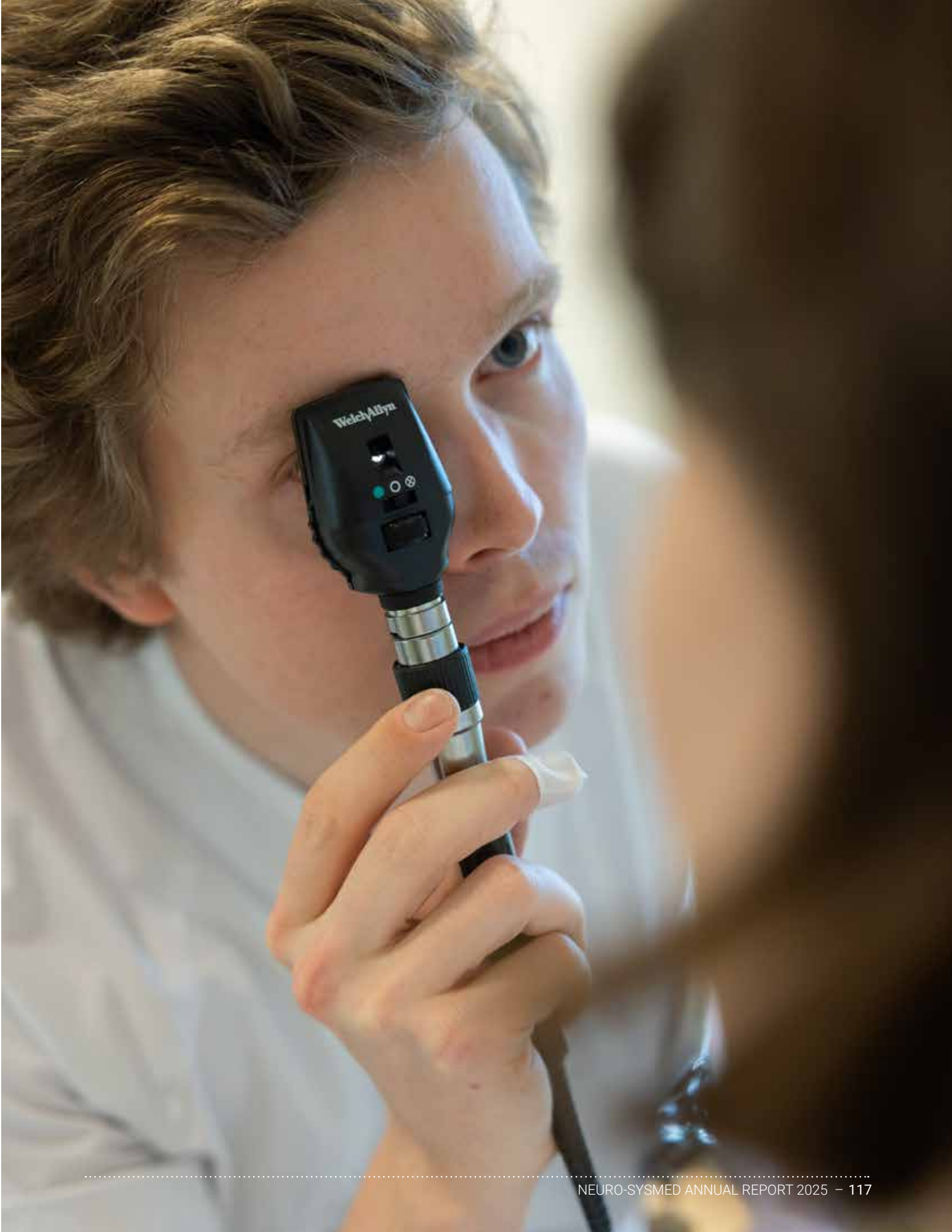
KRISTINE YTREHUS-LYNUM (PhD Candidate)

Ytrehus-Lynum holds an MSc in Clinical Psychology (Cand. Psychol.) from St. Olavs Hospital and The Norwegian University of Science and Technology, Trondheim. She is currently a PhD candidate associated to the MS Node. Her PhD research is focused on cognitive behavioural therapy for insomnia in multiple sclerosis, with Bø as co-supervisor.



MARIE YTTERDAL (PhD Candidate)

Ytterdal holds an MSc in biomedical science from the University of Bergen (2024) and is currently a PhD candidate in the MS node. Her project aims to assess and increase the anti-inflammatory potential of extracellular vesicles, targeting innate inflammation caused by pro-inflammatory microglia in MS, for which there is no available treatment today.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NEURO-SYSMED IN THE NEWS

News stories featuring Neuro-Sysmed in 2025 in the media. Date (most recent first), media, title and name of mentioned or interviewed person from the Neuro-SysMed nodes.

Dec. 23, 2025, NRK Vestland: *Reidun fryktar at det einaste spesialiserte MS-senteret blir lagt ned.* Comment from Lars Bø on the possible closing of the MS centre Hakadal AS.

Dec. 18, 2025, På Høyden: *Tildelinger fra Forskningsrådet i desember*. On the allocation of NOK 96 million from the Research Council of Norway and the status as a Centre for Research-based Innovation (SFI) to the Innovation Center for Neuroresilience (ICoN), led by Charalampos Tzoulis.

Dec. 15, 2025, Dagens Medisin: *Storsatsing på forebygging av Parkinsons og demens: – Fantastisk nyhet.* On the financial support from the Research Council of Norway and the status as a Centre for Research-based Innovation (SFI) to the Innovation Center for Neuroresilience (ICoN), led by Charalampos Tzoulis.

Dec. 15, 2025, Khrono: *Åtte sentre får 768 millioner til innovasjon.* On the financial support from the Research Council of Norway and the status as a Centre for Research-based Innovation (SFI) to the Innovation Center for Neuroresilience (ICoN), led by Charalampos Tzoulis.

Dec. 15, 2025, NTB Kommunikasjon: *Ny storsatsing skal forebygge Parkinsons og demens.* On the financial support from the Research Council of Norway and the status as a Centre for Research-based Innovation (SFI) to the Innovation Center for Neuroresilience (ICoN), led by Charalampos Tzoulis.

Dec. 15, 2025, Regjeringa.no, Kunnskaps-departementet: *768 millionar til forskingsdriven innovasjon*. On Centres for Research-based Innovation as an important tool for increasing competitiveness, including the Innovation Center for Neuroresilience (ICoN), led by Charalampos Tzoulis.

Dec. 12, 2025, Forskning.no: *– Å lytte til musikk kan hjelpe hjernen med å holde seg ung*. Comment from Geir Olve Skeie on new research linking listening to music every day with fewer symptoms of dementia.

Dec. 11, 2025, Dagens Medisin: *Professor Bettina Husebø er tildelt Sanitetskvinnenes kvinnehelseforskningspris for sin forskning på kvinnehelse*. On the awarding of the Women's Health Research Prize by the Norwegian Women's Public Health Association to Bettina Husebø for her research. Paper version.

Nov. 20, 2025, NRK Vestland: *Norske MS-forskarar med gjennombrot: – Gjev håp.* About Neuro-SysMed's OVERLORD project for MS, and interview with Øivind Torkildsen.


Medisin

Storsatsing på forebygging av Parkinsons og demens: – Fantastisk nyhet

– Vår visjon er å muliggjøre effektiv behandling og forebygging av nevrodegenerative sykdommer som Parkinsons sykdom og Alzheimers sykdom, sier professor Charalampos Tzoulis.


NRK Nyheter Sport Kultur Humor Distrikt

Vestland Snakk med oss Vestlandsrevyen Vestland i dag God morgon So

Norske MS-forskarar med gjennombrot: – Gjev håp

No kan MS-behandling bli mykje billigare og tilgjengeleg for fleire.

Nov. 15, 2025, Dagbladet: *Dødsblikk*. About near-death experiences. Bettina Husebø interviewed as a researcher and MD treating people in their final stages of life. Paper version.

Nov. 13, 2025, NTB Kommunikasjon: *Kvinnehelse-forskningsprisen 2025 går til professor Bettina Husebø*. On the awarding of the Women's Health Research Prize by the Norwegian Women's Public Health Association to Bettina Husebø. Also in Nationen Nov. 13, 2025: *Professor Bettina Husebø får pris for forskning på kvinnehelse*.

Nov. 10, 2025, Medscape: *How Does EBV Cause Multiple Sclerosis — Hit and Run or Chronic Driver?* Video and transcript of an interview with Øivind Torkildsen on the link between the Epstein-Barr virus and MS.

Nov. 7, 2025, Suldalsposten: *Er du klar for å døy heime?* About a societal trend with fewer nursing homes and more elderly people. Interview with Bettina Husebø as an expert in elderly and nursing home medicine. Also in Porten 08.11.25 and Fjordingen 06.11.25.

Nov. 4, 2025, Bergensavisen: *De vil undersøke om flere hjernesykdommer skyldes virus: – Gir håp om behandling*. Interview with Øivind Torkildsen and Charalampos Tzoulis about Neuro-SysMed's research on the connection between neurodegenerative diseases and viruses.

Oct. 13, 2025, TV2: *Frykter «giftige klumper» av svevestøv*. About a new American study showing that air pollution can be linked to a higher risk of developing dementia with Lewy bodies. Interview with Ragnhild Eide Skogseth as an expert on this disease.

Oct. 8, 2025, Kebanhaber: *Niagen Bioscience hisseleri Parkinson tedavisi lisansıyla yükseldi*. About Niagen Bioscience entering into a licensing agreement with Haukeland University Hospital and Charalampos Tzoulis to develop nicotinamide riboside as a potential treatment for Parkinson's disease. The agreement is based on data from the NOPARK study.

Oct. 3, 2025, Medicalonline.hu: *40 éves a SZTE-n az angol nyelvű orvosképzés*. About the 40th anniversary of an English-language medical program at the University of Szeged in Hungary, celebrated with an international alumni gathering where Charalampos Tzoulis gave a lecture on disease-modifying treatments for Parkinson's disease.

Oct. 4, 2025, Forskning.no: *Forskere vil finne ut om virus står bak sykdommer i hjernen*. Interview with Øivind Torkildsen and Charalampos Tzoulis about Neuro-SysMed's research on the connection between neurodegenerative diseases and viruses. Also in English version in Sciencenorway.no dated 11.10.25. Also in ABC Nyheter 04.10.25.

Sep. 26, 2025, UiB News: *Viste bredden av innovasjon ved UiB*. About UiB's Innovation Day, September 19, including mentions of Kjell-Morten Myhr, Lydia Boyle, and Amy Van Den Hooven.

Sep. 11, 2025, ScienceBusiness: *University of Bergen: New Mohn research centre for neuroprotection to pave way for prevention of neurodegenerative diseases*. About the establishment of the Mohn Research Center for Neuroprotection at the University of Bergen, led by Charalampos Tzoulis, which aims to develop early detection and prevention of neurodegenerative diseases such as Parkinson's, DLB, and MSA.

Sep. 11, 2025, Dagbladet: *Livsstilsykdom øker Parkinson-risiko. Ny studie avslører overraskende sammenheng*. About a new study from the UK Biobank showing that people with metabolic syndrome have

a higher risk of developing Parkinson's disease. Comment from Charalampos Tzoulis as an expert on Parkinson's. Paper version.

Sep. 4, 2025, Alphagalileo: *New Mohn Research Center for Neuroprotection in Norway paves the Way to Prevention for Neurodegenerative Diseases*. Similar topic as above. Same article in French in Ma Clinique 04.09.25, Le New Mohn Research Center vise à protéger le cerveau et à prévenir la maladie de Parkinson. Also in NewsMedical.

Sep. 4, 2025, TV2 News: *Lysende demenshjelp*. Interview on DARK.DEM with PhD student Sunniva Skagen and research nurse Anne Marie Espeland Mork.

Sep. 4, 2025, Helse Bergen: *Nytt Mohn forskingssenter skal sørge for banebrytande studiar på hjernesjukdomar*. On the establishment of the Mohn Center for Neuroprotection, with the ambitious goal of preventing neurological diseases before they emerge. Charalampos Tzoulis, Johannes Gaare, Christian Dölle, Yamila Torres Cleuren. Also in UiB News.

Sep. 3, 2025, MedWatch: *Oppretter nytt Mohn-forskningssenter for studier på hjerne-sykdommer*. Similar topic as above.

Sep. 3, 2025, NTB Kommunikasjon: *Nytt Mohn forskningssenter skal sørge for banebrytende studier på hjernesykdommer – kan man forebygge Parkinson og demens?* Similar topic as above.

Sep. 3, 2025, Dagbladet Pluss: *Ny studie: Sjokkfunn om høyt blodtrykk*. Charalampos Tzoulis on the link between metabolic syndrome and Parkinson's.

Sep. 1, 2025, Psykologtidsskriftet: *Kronikk: Evidens i møte med den enkelte pasienten*. Op-ed by PhD student Kjersti Nedreskår, who argues that findings from group studies gain practical value when integrated with evidence from other research designs and the specific context in which the psychologist is working.

Aug. 29, 2025, Nettavisen: *Vil man dø, må man få lov til det*. About Samuel Massie and his granddad. Interview with Bettina Husebø about end-of-life care.

Aug. 27, 2025, UiB News: *Å velge døden: En samtale om aktiv dødshjelp i Norge*. YouTube-video. A panel consisting of UiB professors Espen Gamlund, Bettina S. Husebø, and Sören Koch is discussing assisted dying through the viewpoints of medical, ethical, and legal research.

Aug. 24, 2025, Stavanger Aftenblad: *Hun må leve akkurat nok: – Håpet er utrolig viktig*. ALS patient story featuring Bettina Husebø and referencing Neuro-SysMed's research.

Aug. 22, 2025, UiB News: *Dette har blitt en suksess uten sidestykke*. Bettina S. Husebø on the Helgetun project.

Aug. 18, 2025, Maldankon: *Rituximab Triumphs Over Cladribine in Groundbreaking Multiple Sclerosis Study*. On one of the MS node's projects, including comments from Brit Ellen Rød.

Aug. 15, 2025, UiB News: *Setter kunnskapspolitikk på dagsorden under Arendalsuka*. About UiB's participation at Arendalsuka, including Kjell-Morten Myhr in a debate on the national action plan for clinical studies.

Aug. 18, 2025, NeurologyLive: *Target Trial Emulation Favors Rituximab's Effectiveness Over Cladribine in Treating Multiple Sclerosis*. On one of the MS node's projects, with comments from Brit Ellen Rød.

Aug. 3, 2025, Bergens Tidende: – *Eldre er en kjemperessurs for samfunnet*. Helgetun's residents will now become TV celebrities through the documentary "Senioreksperimentet".


HELSE BERGEN

Nytt Mohn forskingssenter skal sørge for banebrytande studiar på hjernesjukdomar

Kvart år blir millionar av menneske råka av alvorlege og uhelbredelege hjernesjukdomar som Parkinsons sjukdom og demens med Lewy-legemer. I Bergen etablerast no Mohn-senteret for nevroproteksjon, med eit ambisiøst mål om å snu utviklinga og førebyggje sjukdom før den bryt ut.

Publisert 9/4/2025
Sist oppdatert 9/10/2025

Ledelsen ved senteret (f.v) Yamila Torres Cleuren, Johannes Gaare, Janne Grønli, Charalampos Tzoulis, Christian Dölle


Bergens Tidende

– Eldre er en kjemperessurs for samfunnet

På Helgetun i Sædalen bor 43 eldre i et helt spesielt fellesskap. Nå blir de TV kjendiser.

Stavanger Aftenblad

Hun må leve akkurat nok: – Håpet er utrolig viktig

Dagbladet

Ny studie: Sjokkfunn om høyt blodtrykk

I en ferisk studie kobler forskerne vanlige livsstilssykdommer opp mot en alvorlig hjernesykdom som rammer folk ned i 40-årsalderen.

Aug. 4, 2025, Dagbladet Pluss: *Autisme kobles til alvorlig lidelse*. On the connection between autism and Parkinson's, including comments from Brage Brakedal.

Jul. 16, 2025, Dagens Medisin: *Hvordan kan vi ruste oss for en framtid der hjernehelsen settes under økende press?* Opinion piece mentioning Neuro-SysMed as a promising pathway for Norway to strengthen its neuroscience research environment.

Jul. 11, 2025, Street Insider: *Niagen Bioscience Secures Exclusive License to Develop and Commercialize its NAD+ Precursor, Patented Nicotinamide Riboside (Niagen®), as a Potential Parkinson's Disease Therapy in Agreement with H.* On the licensing of Parkinson's treatment to Niagen Bioscience based on data from Neuro-SysMed's NOPARK study

Jul. 10, 2025, Longevity Technology: *Niagen Bioscience secures exclusive rights for Parkinson's therapy*. Similar story as above.

Jul. 10, 2025, Bergensavisen: *Har inngått lisensavtale*. Similar story as above – international development of a potential treatment from Neuro-SysMed that may slow Parkinson's progression.

Jul. 10, 2025, Sandefjords Blad: *Utvikling av ny behandling kan gi ny hverdag for Parkinson-pasienter*. Similar story as above. Also 09.07.25 in Kvinnheringen Pluss, Folkebladet Pluss, Adresseavisen, Teknisk Ukeblad, Altaposten Pluss, Sykepleien, Dagens Medisin, and ABC Nyheter.

Jul. 9, 2025, Pharmaceutical Technology: *Niagen Bioscience signs exclusive licence deal for PD therapy*. Similar story as above.

Jul. 9, 2025, Bergens Tidende: *Han forsker på medisin mot Parkinsons. Nå er lisensen solgt*. Similar story as above.

Jul. 8, 2025, MedWatch: *Norsk forskning lisensiert til amerikansk legemiddelutvikler.* Similar story as above.

Jul. 8, 2025, Marketscreener: *Niagen Bioscience Secures Exclusive License to Develop and Commercialize Its NAD+ Precursor, Patented Nicotinamide Riboside (Niagen®), as A Potential Parkinson's Disease Therapy in Agreement with Haukeland University Hospital in Bergen, Norway.* Similar story as above.

Jul. 8, 2025, advfn: *Niagen Bioscience Shares Climb Following Exclusive License for Parkinson's Therapy*. Similar story as above, but with an investor-angle version.

Jul. 8, 2025, Helse Bergen: *Nytt håp for pasientar med Parkinson: Forskingsgjennombrot frå Bergen lisensiert internasjonalt.* Similar story as above.

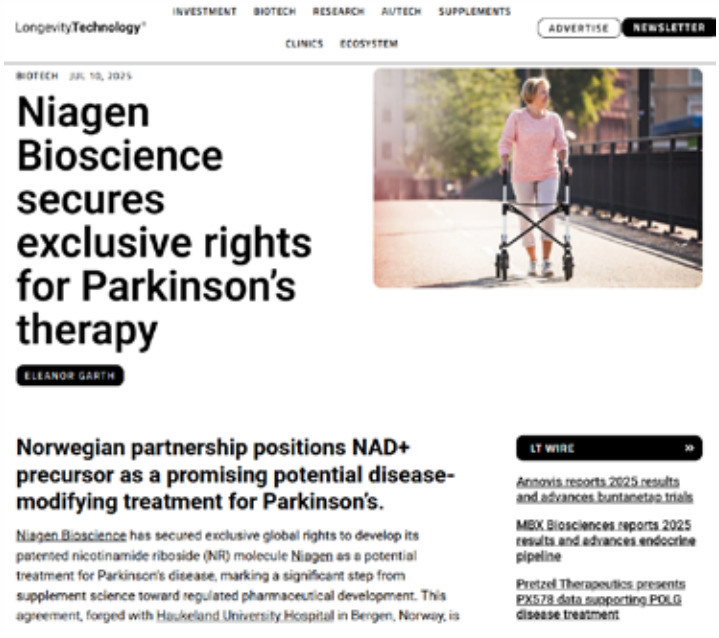
Jul. 8, 2025, com Francais: *Le cours de Niagen Bioscience augmente suite à une licence exclusive pour un traitement contre Parkinson*. Similar story as above. Also in Investing.com Thailand, Hong Kong, Espana, Australia, Brasil, Vietman, Mexico, Philippines, South Africa, UK, India, Canada, South Korea, and Italia.

Jul. 8, 2025, NRK Vestland: *Milepæl for Parkinsons-forsking i Bergen.* Similar story as above.

Jul 8, 2025, Bergensavisen: *Bergensforskning på Parkinsons kan gi ny behandling: Har inngått lisensavtale*. Similar story as above.

Jul. 8, 2025, Bergens Tidende: *Han jakter på Parkinson-medisin. Nå har USA-selskap bladd opp*. Similar story as above.

Jul. 8, 2025, Business Wire: *Niagen Bioscience Secures Exclusive License to Develop and Commercialize it*. Similar story as above.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ADVERTISE NEWSLETTER

BIOTECH JUL 10, 2025

Niagen Bioscience secures exclusive rights for Parkinson's therapy

ELEANOR GARTH

Norwegian partnership positions NAD+ precursor as a promising potential disease-modifying treatment for Parkinson's.

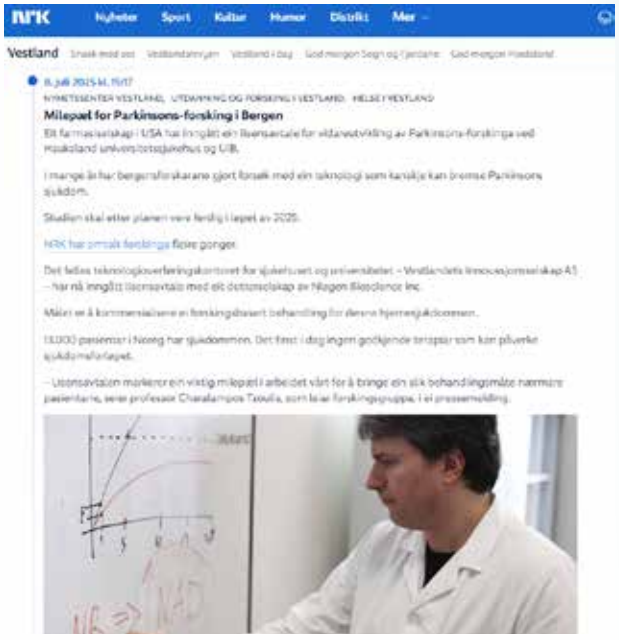
Niagen Bioscience has secured exclusive global rights to develop its patented nicotinamide riboside (NR) molecule Niagen as a potential treatment for Parkinson's disease, marking a significant step from supplement science toward regulated pharmaceutical development. This agreement, forged with Haukeland University Hospital in Bergen, Norway, is

LT WIRE

Annovis reports 2025 results and advances buntanetap trials

MBX Biosciences reports 2025 results and advances endocrine pipeline

Pretzel Therapeutics presents PX578 data supporting PDLG disease treatment


NRK Nyheter Sport Kultur Humor Distrikt Mer

Vestland

Milepæl for Parkinsons-forsking i Bergen

Jul. 8, 2025, Mammoth Times: *Niagen Bioscience Secures Exclusive License to Develop and Commercialize its NAD+ Precursor, Patented Nicotinamide Riboside (Niagen®), as a Potential Parkinson's Disease Therapy in Agreement with Haukeland University Hospital in Bergen, Norway*. Similar story as above. Identical article 08/09.07.2025 in Financial Content, Advfn plc, Placera, Stockwatch, Advanced Financial Network, Marketscreener, Yahoo! Finance, AP News, FirstWord Pharma, Market Minute, Htv10 Tv, Morningstar, Le Lézard (English), Todays Family Magazine, Business.punxsutawneyspirit, Starkville Daily News, MyMotherLode, BioSpace, Benzinga, Stock Titan, Business.decaturdailydemocrat.com, The AI Journal, The Inyo Register, AM 1440 KYCR, The Antlers American, The Evening Leader, The Pilot News, St. Marys Daily Press, Benton Courier, Market Screener, and Stock House.

Jul. 8, 2025, Adresseavisen: *Lars-Erik (31) bodde på sykehjem. Frp håper at flere gjør som ham.* About the Paulus nursing home in Oslo, where students and elderly people live side by side. Includes comments from Bettina S. Husebø on innovative living arrangements for older adults.

Jun. 19, 2025, UiB News: *Nasjonalt kurs i brukermedvirkning i medisinsk og helsefaglig forskning – samhandling mellom brukere og forskere*. About the Neuro-SysMed/CCBIO course CCBIONEUR910.

Jun. 5, 2025, UiB News, Doctoral Degrees: *Rituksimab - den ultimate behandling mot multippel sklerose?* Press release about Brit Ellen Rød's doctoral thesis.

May 30, 2025, Smaalenenes Avis: *Trygve har uhelbredelig sykdom og er på Helsehuset: - Jeg tar en dag av gangen.* ALS patient story, mentioning the NO-ALS study.

May 28, 2025, Aldring og Helse: *Kan en kommunal koordinator være et tiltak for familier som rammes av demens?* Interview with Line Berge about the results from the completed LIVE study.

May 22, 2025, Connect Iredell: *Endurance Bio Inc. Announces Selection of T-168 for Neuro-SysMed's SLEIPNIR Platform Trial in Parkinson's Disease*. Coverage of Neuro-SysMed's SLEIPNIR platform study. Identical story on 22.05.2025 in Times Of The Islands, Trading View, Mammoth Times, Ashland, Norwood, The Atmore Advance, Suffolk News Herald, Dailyleader, Millcreek Journal, Bonita And Estero Magazine, Valley Times News, Taylorsville Journal, The Chillicothe Voice, Mb News, Natick Town News, Sandy Journal, Luvernejournal, Greenville Business Magazine, Sugar House Journal, South Salt Lake Journal, Style Magazine, Leader Publication, West Valley City Journal, Gulf And Main Magazine, Franklin, Ironton Tribune, Draper Journal, Columbia Business Monthly, Indica News, Valley Journals, Austin Herald, Alexander City Outlook, Advanced Financial Network, Global Tech Reporte, Midvale Journal, The Tidewater News, Financial Content, Market Minute, The Greenville Advocate, The Evening Leader, The Antlers American, Finance Minyanville, Street Insider, Vicks Burg Post, Blue Grass Live, Tallassee Tribune, South Jordan Journal, Gates County Index, Connect Fayetteville, SMB World Report, Montserrat Daily News. Htv10 Tv, La Grange News, Demopolis Times, Parish News, Yahoo! Finance, Value Spectrum, The Clanton Advertiser, Washington Daily News, Menafn, FirstWord Pharma, Benzinga, Pharma Focus Europe, Face Magazine, The Natchez Democrat, Albert Lea Tribune, Today In Business, Harlan Enterprise, The Selma Times-Journal, Santé log, Wall Street Business News, Chester County Press, St. Marys Daily Press, Morningstar, The Manila Times, Roanoke Chowan News Herald, Milford Free Press, Todays Family Magazine, Today in the News, Boreal Community

Media, Riverton Journal, Andalusiastar News, Rsw Living Magazine, The Community Post, West Jordan Journal, Wnc Business, The State Journal, Troy Messenger, Herriman Journal, Tryon Daily Bulletin, Global Tech Times, Elizabethton Star, Southwest Daily News, Walnutcreekmagazine.com, Business.malvern-online.com, Hattiesburg, The Morgan News, Markets Businessinsider.com, BizWire Express, Post Searchlight, Benton Courier, The Pilot News, The Inyo Register, The Brewton Standard, Smith Field Times, Toti, Windsor Weekly, Murray Journal, Alabama Now, BioSpace, The Lowndes Signal, Davis Journal, Prentiss Headlight, Hopedale, Business.decaturdailydemocrat.com, Times of San Diego, AP News, The Oxford Eagle, Chinese Wire, World News, Holladay Journal, Todays Family Magazine, Pharma Focus Europe, Cape Coral Living Magazine, The State Journal, The Coastland Times, Enews Park Forest, The Jewish Link of Bronx, Westchester & Connecticut, Magnoliastatelive, Ein News, and The Wetumpka Herald.

May 20, 2025, UiB News: *Syv innovative prosjekter mottar UiB Idé-finansiering.* Article about the projects funded by the innovation program UiB Idé this year, including PhD student Lydia Boyle at the Care Node.

May 20, 2025, UiB News, Doctoral Degrees: *Kan kjente legemidler og næringsstoffer bekjempe Parkinsons?* Press release about the doctoral thesis by Julia Axiina Tuominen.

May 3, 2025, Harstad Tidende: *Kan stå foran et historisk gjennombrudd*. Interview with Charalampos Tzoulis and Lemia Boussaada on new Parkinson's research.

Apr. 30, 2025, Vanity Fair Italia: *NAD+, cos'è, come si assume e perché è considerato l'elisir chiave per la longevità. Tutta la verità*. Mentions Charalampos Tzoulis and his statements on NAD+ research. Also in Radiowow 30.04.2025.

Apr. 29, 2025, Dagens Medisin: *Forsker på MS-medisinen som ble innført: – Veldig gledelig beslutning.* Interview with Øivind Torkildsen about a study comparing Ocrevus with Rituximab. Also covered by Legemiddelindustriforeningen 01.05.2025.

Apr. 27, 2025, Sydvesten: *Professorens råd for å holde seg frisk lengst mulig.* Interview with Charalampos Tzoulis about factors that can delay ageing. Mentions the NADage study. Also in Bergensavisen 09.04.2025.

Apr. 11, 2025, NRK: *Tango med Parkinson*. Patient story featuring an interview with Geir Olve Skeie on music as therapy.

Apr. 7, 2025, Bergensavisen: *Professorens råd for å holde seg frisk lengst mulig*. Interview with Charalampos Tzoulis about ageing.

Apr. 4, 2025, Lister24: *Denne klokken skal finne livets sluttfase*. On the inclusion of the nursing homes Farsund Omsorgssenter and Listaheimen in the 5-D project at SEFAS, and the visit from Bettina S. Husebø and Kamilla Haugland-Pruitt.

Apr. 4, 2025, Legemiddelindustriforeningen: *Alzheimers og Parkinsons sykdom: Biomarkører og innovasjoner gir håp.* About a panel debate on Norway's position in clinical trials in neurology, with panel participants Ragnhild Eide Skogseth and Gard Aasmund Skulstad Johanson, at the international conference on Alzheimer's and Parkinson's disease in Vienna.

Apr. 2, 2025, Podcast Helsesjekken, BA: *Hvordan holde aldersforfallet unna*. Interview with Charalampos Tzoulis about ageing.

Apr. 1, 2025, Bergens Tidende: *Han vil forebygge Parkinson. Det er aldri gjort før.* Interview with Charalampos Tzoulis on the NADream study. Also in Adresseavisen Pluss, 02.04.2025.

Mar. 27, 2025, Dagens Medisin: *Fra MS-revolusjonen til Alzheimer: En ny æra for behandling*. Opinion piece by Øivind Torkildsen and Kjell-Morten Myhr, arguing that developments in MS show the importance of early and proactive treatment, and that Alzheimer's may be facing a similar revolution.

Mar. 16, 2025, Aldring og Helse: *Kan mørket være medisin?* Interview with Line Iden Berge on the DARK. DEM trial.

Mar. 12, 2025, HealthTalk: *Norske MS-eksperter vil bli rektor og viserektor ved UiO og UiB*. About two of Norway's leading MS experts – including Kjell-Morten Myhr – are moving into key leadership roles at their respective universities.

Mar. 2, 2025, Firdaposten: *For 30 år sidan fanst det inga behandling for sjukdomen Sara Louise fekk som 17-åring*. Patient case on MS. Comments from Kjell-Morten Myhr. Also in Haugesunds Avis February 24, 2025, and in Bergensavisen February 25, 2025.

Feb. 23, 2025, Bergensavisen: *For 30 år siden fantes ingen behandling for sykdommen Sara Louise fikk som 17-åring*. MS patient story with interview comments from Kjell-Morten Myhr. Also in Haugesunds Avis 24.02.2025 and Firdaposten 02.03.2025.

Feb. 20, 2025, Helse Bergen: *25 millionar til forsking på Alzheimers*. About a grant from KLINBEFORSK to Neuro-SysMed's Dementia Research Node for a study on new Alzheimer's treatment.

Feb. 20, 2025, Vogue India: *NAD+ infusions have become increasingly popular for anti-ageing. But are they too good to be true?* Mentions Charalampos Tzoulis and his statements on NAD+ research. Also in Vogue Adria 30.12.2024.

Feb. 14, 2025, Sykepleien: *Fem millioner til forskning på Parkinson*. Interview with Charalampos Tzoulis in connection with the Norwegian Parkinson's Association's 5 MNOK support for the Hydra project.

Feb. 10, 2025, Dagens Medisin: *Millionstøtte til nasjonal plattform for utprøvende behandling mot Parkinsons*. Interview with Charalampos Tzoulis about the Hydra project.

Feb. 3, 2025, UiB News: *Forskerskolens posterpresentasjoner - vinnere 2025*. Oral presentation prize to Neuro-SysMed postdoc Gonzalo Nido, and poster prize to PhD candidate Brit Ellen Rød.

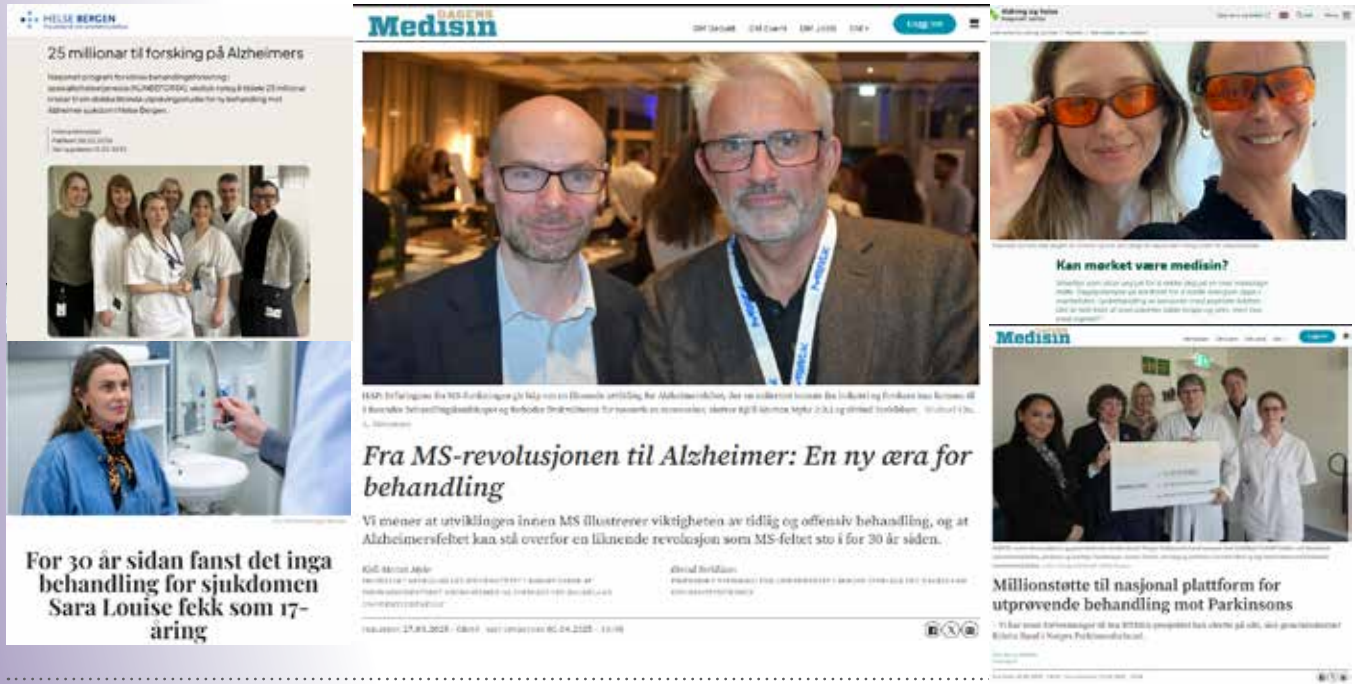
Jan. 26, 2025, Sydvesten Pluss: *Fikk beskjed om at hun bare var en sliten småbarnsmor. Elleve år senere kom svaret*. MS patient story with comments from Kjell-Morten Myhr. Also in Bergensavisen 21.01.2025 and in Nordhordland 15.01.2025.

Jan. 13, 2025, UiB News: *Pårørendebanken - Vil skape felleskap for pårørende til demenssyke*. About an initiative for dementia patients and their relatives, supported by Neuro-SysMed's Care Node.

Jan. 11, 2025, Bergensavisen: *Sunnivas lange kamp for svar*. Kjell-Morten Myhr. Also in Sydvesten January 26, and in Avisa Nordhordland January 11.

Jan. 9, 2025, UiB News: *Aktiv aldring i praksis: Kan felles bomiljø for eldre utsette demens og fysisk forfall?* About the Care Node and the ActiveAgeing/ Helgetun project.

Paraplyen, No. 1, 2025: *Kunstig intelligens i eldremedisin: Et paradigmeskifte er i gang*. Commentary piece from Line Iden Berge and Monica Patrascu on AI in nursing home medicine.



SOCIAL MEDIA

Neuro-Sysmed is active with its own profiles on Facebook and LinkedIn, sharing information on courses, seminars, and other events, and highlighting ongoing research activities and project milestones throughout the year. See selected 2025 examples below.

PUBLICATION LIST 2025

Relevant publications from the Neuro-SysMed researchers in 2025.

1. **Reithe H, Patrascu M, Torrado JC, Forsund E, Husebo BS, Kverneng SU, Sheard E, Tzoulis C, Marty B.** Wavelet-Based Tremor Quantification From Wrist-Worn Sensor Data in Home-Dwelling People With Parkinson's Disease. *IEEE J Transl Eng Health Med*. 2025 Dec 25;14:19-28. doi: 10.1109/JTEHM.2025.3648704. eCollection 2026. PMID: 41668775.

2. **Høgestøl EA, Sowa P, Holmøy T, Bø L, Nygaard GO, Wergeland S.** Revised diagnostic criteria for multiple sclerosis. *Tidsskr Nor Laegeforen*. 2025 Dec 1;145(15). doi: 10.4045/tidsskr.25.0592. Print 2025 Dec 16. PMID: 41410973.

3. **Tangedal NM, Tysnes OB.** Impulse control disorders and dopamine receptor agonism in Parkinson's disease patients: Clinical implications. *Parkinsonism Relat Disord*. 2026 Feb;143:108147. doi: 10.1016/j.parkreldis.2025.108147. Epub 2025 Dec 9. PMID: 41387037. Review.

4. **Furevik LL, Lapina O, Lindland ES, Høgestøl EA, Geier OM, Devik K, Farmen AH, Flemmen HØ, Harbo HF, Morsund ÅH, Novotny V, Ofte HK, Pedersen KO, Popperud TH, Ratajczak-Tretel B, Samsonsen C, Selnes P, Torkildsen Ø, Undseth RM, Aamodt AH, Beyer MK, Boldingh MI**. Brain MRI findings in patients with post COVID-19 condition: frequency and longitudinal changes in a nationwide cohort study. *Front Neurol*. 2025 Nov 13;16:1662263. doi: 10.3389/fneur.2025.1662263. eCollection 2025. PMID: 41323230.

5. **Schoof LG, Rød BE, El Mahdaoui S, Michelsen JS, Høgestøl EA, Myhr KM, Rise HH, Su Z, Eriksson F, Friede T, Lundell H, Sellebjerg F, Sidaros K, Siebner HR, Wiggermann V, Jasperse B, Lissenberg-Witte B, van Oosten BW, Schoonheim MM, Edan G, Gaubert M, Le Page E, Kerbrat A, Michel L, Strijbis EMM, Torkildsen Ø, Christensen JR**. Non-inferiority of Rituximab versus OCrelizumab in Multiple Sclerosis (ROC-MS)-an individual participant data meta-analysis. *Mult Scler Relat Disord*. 2026 Jan;105:106858. doi: 10.1016/j.msard.2025.106858. Epub 2025 Nov 11. PMID: 41317517.

6. **Kapali A, Daltveit AK, Myhr KM, Bjornevik K, Eid K, Bjørk MH, Brantsæter AL, Riise T, Cortese M**. Vitamin D intake and multiple sclerosis risk in the Norwegian Mother, Father and Child cohort. *J Neurol Neurosurg Psychiatry*. 2025 Nov 28:jnnp-2025-337300. doi: 10.1136/jnnp-2025-337300. Online ahead of print. PMID: 41314793.

7. **Torkildsen Ø, Bru ANS, Behzadi GIN, Myhr KM.** Successful Treatment of Progressive Multifocal Leukoencephalopathy With Tenofovir Alafenamide Fumarate. *Neurol Neuroimmunol Neuroinflamm*. 2026 Jan;13(1):e200522. doi: 10.1212/NXI.0000000000200522. Epub 2025 Nov 25. PMID: 41289545.

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PERSONNEL LIST 2025

People affiliated to Neuro-SysMed in 2025.

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Øivind Torkildsen	MS Node	Professor, Principal Investigator, MS Node Co-Leader
Lars Bø	MS Node	Professor
Karine Eid	MS Node	Postdoc
Hedda Kristiane Bjordal Foss	MS Node	Medical Student
Sonia Gavasso	MS Node	Researcher
Andrea Kyvik Habbestad	MS Node	PhD Candidate
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Håkon Olsen	MS Node	Master Student
Brit Ellen Rød	MS Node	Postdoc
Liv Marie Rønhovde	MS Node	PhD Candidate
Casper Eugen Sandvik	MS Node	Research Assistant
Stine Schikora-Rustad	MS Node	PhD Candidate
Trond Trætteberg Serkland	MS Node	PhD Candidate
Hannah Sofie Sjo	MS Node	Medical Student
Anne Britt Rundhovde Skår	MS Node	Study Nurse
Tori Smedal	MS Node	Researcher
Marthe Sofie Svendgård	MS Node	Medical Student Research Program Student

Name	Node	Position
Fredrik Thesen	MS Node	Medical Student
Hilde Marie Torgauten	MS Node	PhD Candidate
Julia Axxina Tuominen	MS Node	Researcher
Amy van der Hooven	MS Node	PhD Candidate
Christian Vedeler	MS Node	Professor
Jorunn Vik	MS Node	Study Nurse
Stig Wergeland	MS Node	Associate Professor
Johannes Willumsen	MS Node	PhD Candidate
Reidun Waaler	MS Node	Study Nurse
Kristine Ytrehus-Lynum	MS Node	PhD Candidate
Marie Ytterdal	MS Node	PhD Candidate
Luna Aadland	MS Node	Medical Student
Jan Aarseth	MS Node	Researcher, MS Registry
Charalampos Tzoulis	PD Node leader	Professor, Principal Investigator, Centre Director, PD Node Leader
Heloisa Galbiati Belmonte	PD Node	Senior Engineer/Communications Officer
Julia Saltyte Benth	PD Node	Medical Student
Birgitte Berentsen	PD Node	Postdoc
Haakon Berven	PD Node	PhD Candidate
Tale Litlere Bjerknes	PD Node	PhD Candidate
Brage Brakedal	PD Node	Postdoc
Hannah Matthews Celius	PD Node	Master Student
Christian Dölle	PD Node	Senior Researcher
Regine Engelsen Eide	PD Node	Study Nurse
Synne Geithus	PD Node	PhD Candidate
Andrea Gremes	PD Node	Research Assistant
Johannes Jernqvist Gaare	PD Node	Researcher
Gard Aasmund Skulstad Johanson	PD Node	PhD Candidate
Olena Kondratska	PD Node	Postdoc
Simon Kverneng	PD Node	Postdoc

Name	Node	Position
Connor Langworth-Green	PD Node	Clinical Researcher
Anna Stylianou Lerpold	PD Node	Medical Student
Peder Lillebostad	PD Node	PhD Candidate
Katarina Lundervold	PD Node	PhD Candidate
Julia Nienhuis	PD Node	Intern Student
Kristina Njøsen	PD Node	Study Nurse
Shridar Patil	PD Node	Medical Student
Anna Rubiolo	PD Node	PhD Candidate
Erika Sheard	PD Node	Study Nurse
Kristin Bekken Sjåstad	PD Node	Study Nurse
Geir Olve Skeie	PD Node	Clinical Researcher
Kjersti Stige	PD Node	PhD Candidate
Magnus Svensen	PD Node	PhD Candidate
Mona Søgnen	PD Node	Study Nurse
Ximena Velasquez	PD Node	Master Student
Therese Vetås	PD Node	Study Nurse
Ole-Bjørn Tysnes	ALS Node	Professor, Principal Investigator, ALS Node Co-Leader
Tale Litlere Bjerknes	ALS Node	Postdoc, ALS Node Co-Leader
Synnøve Bartz-Johannesen	ALS Node	Study Nurse
Mari Klauset Holtom	ALS Node	Study Nurse
Tina Rekand	ALS Node	Clinical Researcher
Marit Rensaa	ALS Node	Study Nurse
Magne Haugland Solheim	ALS Node	PhD Candidate
Carolin Sparcholz	ALS Node	Clinical Researcher
Tina Taule	ALS Node	Researcher
Kristoffer Haugarvoll	Dementia Node	Associate Professor, Principal Investigator, Dementia Node Co-Leader
Ragnhild Eide Skogseth	Dementia Node	Associate Professor/Postdoc, Principal Investigator, Dementia Node Co-Leader
Cesilie Dahll	Dementia Node	Biomedical Laboratory Scientist

Name	Node	Position
Lasse Giil	Dementia Node	Postdoc/Associate Professor
Lone Birkeland Johansen	Dementia Node	Study Nurse
Siri Voltersvik Landro	Dementia Node	Clinical Researcher
Enny Lauen	Dementia Node	Medical Student
Polina Mykhailova	Dementia Node	Clinical Researcher
Liv Toril Møen	Dementia Node	Clinical Researcher
Ingrid Revheim	Dementia Node	Researcher
Ida Kristine Sangnes	Dementia Node	Research Coordinator Haraldsplass
Kristina Skeie	Dementia Node	Study Nurse
Ole Martin Steihaug	Dementia Node	Clinical Researcher
Kristin Eidsheim Sønnesyn	Dementia Node	PhD Candidate
Irit Titlestad	Dementia Node	PhD Candidate
Bettina S. Husebø	Care Node	Professor, Principal Investigator, Care Node Leader
Line Iden Berge	Care Node	Professor
Lydia Dawn Boyle	Care Node	PhD Candidate
Valentina Casadei	Care Node	Postdoc
Kirsti Eikeland	Care Node	Researcher
Annelise Elde	Care Node	PhD Candidate
Elise Førsund	Care Node	PhD Candidate
Farzana Haque	Care Node	PhD Candidate
Anne Therese Kjellevold Hatle	Care Node	PhD Candidate
Justin Haugland-Pruitt	Care Node	PhD Candidate
Kamilla Gjerland Haugland-Pruitt	Care Node	Postdoc
Eirin Hillestad	Care Node	PhD Candidate
Tanja Lukkari	Care Node	Research Nurse
Brice Sylvain Daniel Marty	Care Node	Researcher
Kjersti Nedreskår	Care Node	PhD Candidate
Shivam Pandey	Care Node	PhD Candidate
Monica Patrascu	Care Node	Researcher
Shakil Rajan	Care Node	PhD Candidate
Haakon Reithe	Care Node	PhD candidate

Name	Node	Position
Zoya Sabir	Care Node	Postdoc
Manal Ibrahim Mustafa Sharafeldin	Care Node	Professor
Sunniva Vibe Skagen	Care Node	PhD Candidate
Asmat Ullah	Care Node	Postdoc
Lisa Aaslestad	Care Node	PhD Candidate
Jannicke Igland	Drug Discovery, In Silico Branch	Associate Professor, Principal Investigator, Node Leader Drug Discovery Node, In Silico Branch
Aurora Martinez	Drug Discovery, Experimental Branch	Principal Investigator/Professor, Node Leader Drug Discovery Node, Experimental Branch
Kjetil Bjørnevik	Drug Discovery, In Silico Branch	Guest Researcher
Marianna Cortese	Drug Discovery, In Silico Branch	Guest Researcher
Anne Kjersti Daltveit	Drug Discovery, In Silico Branch	Professor
Oskar Henriksen Gussiås	Drug Discovery, In Silico Branch	Master Student
Kari Juul	Drug Discovery, In Silico Branch	Adviser, Project Coordinator
Ragnhild Alfnes Larsen	Drug Discovery, In Silico Branch	Master Student
Asieh Abolpour Mofrad	Drug Discovery, In Silico Branch	Researcher
Trond Riise	Drug Discovery, In Silico Branch	Professor Emeritus
Julia Romanowska	Drug Discovery, In Silico Branch	Senior Engineer/Bioinformatician
Brage Hamre Skjørestad	Drug Discovery, In Silico Branch	Master Student
Magne Haugland Solheim	Drug Discovery, In Silico Branch	PhD Candidate
Julia Axxina Tuominen	Drug Discovery, In Silico Branch	Researcher
Gloria Gamiz	Drug Discovery, Experimental Branch	Postdoc
Trond-Andre Kråkenes	Drug Discovery, Experimental Branch	PhD Candidate
Jung Kunwar KC	Drug Discovery, Experimental Branch	Researcher
Sebastian Gonzalez Rodriguez	Drug Discovery, Experimental Branch	Master Student
Mary Dayne Sia Tai	Drug Discovery, Experimental Branch	Visiting Postdoc
Dimitrios Kleftogiannis	SBB Node	Researcher, SBB Node Co-Leader
Gonzalo Sanchez Nido	SBB Node	Researcher, SBB Node Co-Leader
Jan Reinert Karlsen	RRI/PPI Node	Professor, Principal Investigator, RRI/PPI Node Co-Leader
Caroline B. N. Engen	RRI/PPI Node	Associate Professor, RRI/PPI Node Co-Leader

Name	Node	Position
Administrative and technical support across research nodes		
Ingunn Anundskås	Adm. & Tech. support	Study Coordinator
Martina Galatea Castelli	Adm. & Tech. support	Research Technician
Yamila Torres Cleuren	Adm. & Tech. support	Managing Director, Head of Research and Innovation Strategy
Agnete Svendsen Tenfjord Engelsen	Adm. & Tech. support	Research School Coordinator
Elisabeth Claire Evjenth	Adm. & Tech. support	Technician and Medication Coordinator
Sara Rachel Babunga Johnsen	Adm. & Tech. support	Medication Coordinator
Liesbeth Kroondijk	Adm. & Tech. support	Research Technician
Mona Machrouh	Adm. & Tech. support	Centre and Project Coordinator
Yana Mikhaleva	Adm. & Tech. support	Research Technician
Sepideh Mostafavi	Adm. & Tech. support	Research Technician
Hanne Linda Nakkestad	Adm. & Tech. support	Laboratory Manager
Amra Noor	Adm. & Tech. support	Admin Coordinator
Frank Riemer	Adm. & Tech. support	Researcher, Imaging - MMIV
Omnia Shadad	Adm. & Tech. support	Research Technician
Cecilie Totland	Adm. & Tech. support	Research Technician
Janniche Torsvik	Adm. & Tech. support	Project Coordinator
Celie Tveit	Adm. & Tech. support	Economy Controller (HUH)
Eli Synnøve Vidhammer	Adm. & Tech. support	Communications Officer
Helle Aas	Adm. & Tech. support	Medication Coordinator

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