



Annual Report

Research Activity 2023



Division of Clinical Neuroscience

University of Oslo
Oslo University Hospital
Sunnaas Rehabilitation Hospital





Contents

Oslo University Hospital, Sunnaas Rehabilitation Hospital and the University of Oslo	5
Division of Clinical Neuroscience	5
Division of Clinical Neuroscience (NVR) Organizational Chart.....	6
Department of Physical Medicine and Rehabilitation	7
Rehabilitation after trauma	8
Group Leader: Nada Andelic	
Painful musculoskeletal disorders.....	12
Group Leader: Cecilie Røe	
Department of Refractory Epilepsy - National Centre for Epilepsy.....	11
Complex epilepsy.....	12
Group Leader: Morten Lossius	
Department of Neurosurgery	18
Neurovascular–Cerebrospinal Fluid Research Group.....	19
Group Leader: Per Kristian Eide	
Oslo Neurosurgical Neurotrauma Group	22
Group Leader: Eirik Helseth	
Vilhelm Magnus Laboratory for Neurosurgical Research	25
Group Leader: Einar Vik-Mo	
Functional Neurosurgery Group	29
Group Leader: Ane Eidahl Konglund	
Pediatric Neurosurgical Research Group	32
Group Leader: Radek Frič	





Department of Neurology	36
Movement disorders and neurodegeneration.....	37
Group Leader: Mathias Toft	
Huntington's disease and neurodegenerative genomics.....	40
Group Leader: Lasse Pihlstrøm	
Rare NeuroMuscular Disorders Research Group.....	43
Group Leader: Kristin Ørstavik	
Cerebrovascular diseases.....	48
Group Leader: Mona Skjelland	
Oslo Stroke Clinical Research Group.....	50
Group Leader: Else Charlotte Sandset	
Headache and Stroke.....	52
Group Leader: Anne Hege Aamodt	
ERGO - Epilepsy Research Group of Oslo	56
Group Leaders: Erik Taubøll and Kjell Heuser	
Multiple Sclerosis (MS) – Clinical and epidemiological MS-studies	62
Group Leader: Elisabeth Gulowsen Celius	
Multiple sclerosis (MS) - Therapeutic trials and vaccine studies.....	66
Group Leader: Gro Owren Nygaard	
Multiple Sclerosis (MS) – Imaging studies	69
Group Leaders: Einar August Høgestøl and Hanne Harbo	
Multiple Sclerosis (MS) – Molecular and immunological studies.....	73
Group Leaders: Tone Berge and Hanne Harbo	
Brain plasticity and neuropsychiatry	76
Group Leader: Torbjørn Elvsåshagen	
Cognitive Health Research group (CoHR)	79
Group Leader: Ira Haraldsen	





Department of Research and Innovation	81
Musculoskeletal health	82
Group Leader: Kjersti Storheim	
Headache and pain	86
Group Leader: Bendik Winsvold	
Neurogenetics research group	89
Group Leader: Kaja Selmer	
Research group for applied neurophysiology	92
Group Leader: Kristian Bernhard Nilsen	
Department of Neurorehabilitation	95
Intellectual disability and neurorehabilitation.....	96
Group Leader: Bjørnar Hassel	
Sunnaas Rehabilitation Hospital	52
Specialized medical rehabilitation.....	53
Group Leader: Frank Becker	
Publication list NVR research groups 2023.....	57
Publication list Sunnaas Rehabilitation Hospital 2023	87





Oslo University Hospital, Sunnaas Rehabilitation Hospital and the University of Oslo

Oslo University Hospital (OUH) is Norway's largest hospital with over 24 000 employees and a budget of 23 billion NOK. The Hospital has a local function for parts of Oslo's population. It has a regional function for the inhabitants in the South-Eastern Norway Regional Health Authority, as well as a large number of national functions. The Hospital is responsible for a large part of the medical research and education of health personnel in Norway.

Sunnaas Rehabilitation Hospital offers multidisciplinary rehabilitation to patients with complex functional impairment following illness or injury. The Hospital also holds national responsibilities for rare congenital disorders and locked-in syndrome.

The University of Oslo (UiO) is Norway's largest research and educational institution with 28 000 students and 7 000 employees. Professional breadth and internationally recognized research environments make UiO an important contributor to society. The Faculty of Medicine was established in 1814 and works for progressive education, research and dissemination for the patients' and society's best interests.

Division of Clinical Neuroscience

The Division of Clinical Neuroscience encompasses the disciplines of neurology, neurosurgery, physical medicine and rehabilitation, neuro habilitation and complex epilepsy. The proximity to patients and their medical issues are the cornerstones for the research conducted at our hospitals, and the research aims at improving patient care. High ethical standards ensure the confidentiality and our goal is to continuously improve diagnostics, treatment and management for all our patients.

Research activity

The Division's research activity is organized into 27 different research groups covering a broad range of basic, clinical and epidemiological research, with an overall aim to improve patient care with emphasis on diagnostic, therapeutic and preventive measures. Most group leaders have a combined position at the hospital and the University of Oslo. In total, the Division has 17 Professors, 1 Associate Professor, several postdoctoral fellowships and PhD students, administrative staff and technical staff.

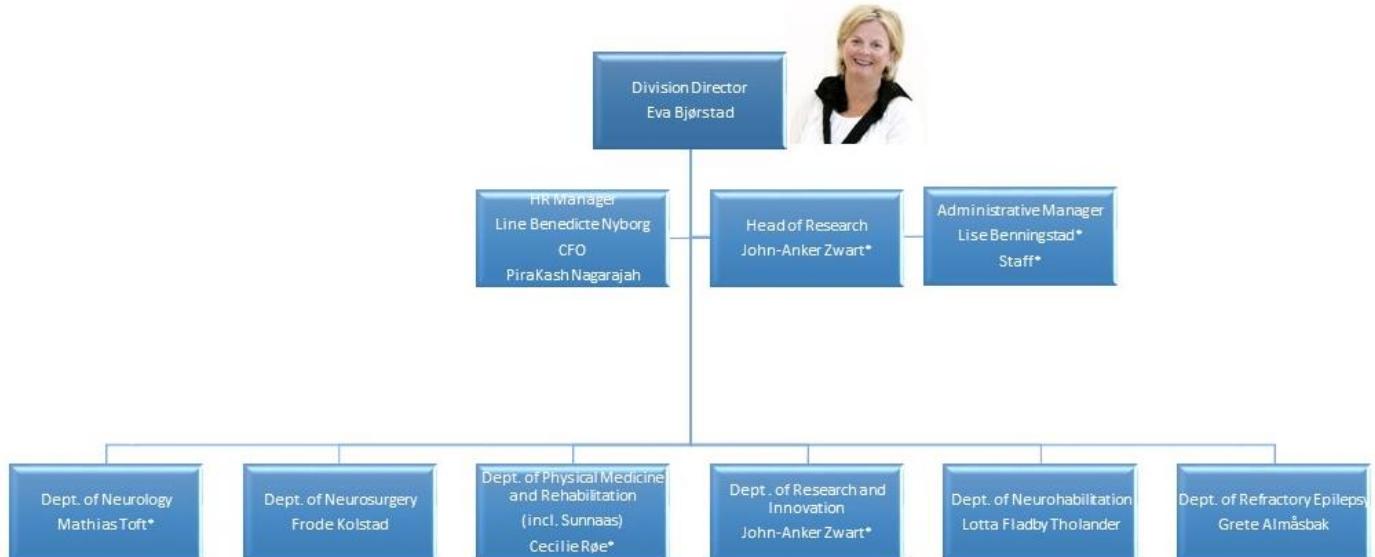
The Division has an advisory research board which in 2023 consisted of: Professor and Head of Research John-Anker Zwart, Division Director Eva Bjørstad, Professors and Senior Consultants Morten Lossius, Eirik Helseth, Lasse Pihlstrøm, Torgeir Hellstrøm, Bjørnar Hassel, Kaja Selmer, Cathrine Buaas Tverdal and Administrative Manager Lise Benningstad.

In 2023 there were in total 217 registered peer reviewed publications and 7 PhD dissertations, while Sunnaas Rehabilitation Hospital published 55 registered peer reviewed articles and had 4 PhD dissertations.

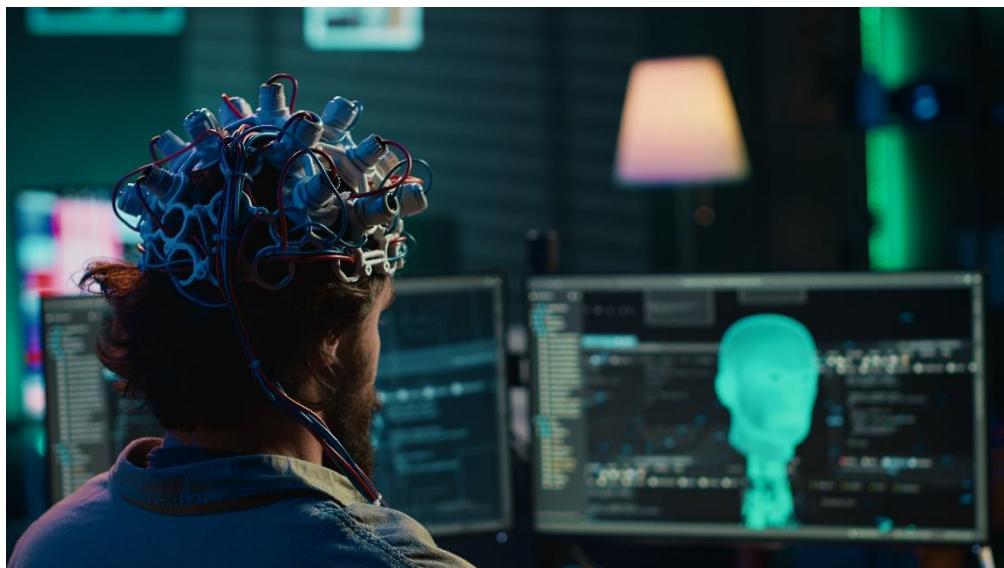




Division of Clinical Neuroscience (NVR) Organizational Chart



*UiO employees





Department of Physical Medicine and Rehabilitation

The Department of Physical Medicine and Rehabilitation has a large outpatient clinic for painful musculoskeletal disorders and carries out early rehabilitation after traumatic brain injuries and other conditions in need of both specialized rehabilitation and hospital care.

The department has a multidisciplinary staff with clinical, educational and research responsibilities. The two research groups: "Painful musculoskeletal conditions" and "Rehabilitation after trauma" conduct clinical interdisciplinary research, aiming to improve treatments programs services and outcome in close collaboration with the users and their organizations is in focus.

The research groups are included in the network of Center for habilitation and rehabilitation services research (CHARM).

The "Rehabilitation after trauma" group has close collaboration with the rehabilitation research group at Sunnaas Hospital and constitute the Oslo Traumatic Brain Injury Outcome and Rehabilitation Research Network (OBIOR).

The Department of Physical Medicine and Rehabilitation is headed by Professor Cecilie Røe.





Rehabilitation after trauma



Group Leader

Nada Andelic, MD/PhD, Professor, Dept. of Nursing Science, UiO
(nada.andelic@medisin.uio.no) / OUH (nadand@ous-hf.no)

Group members

- Cecilie Røe, Professor, UiO
- Erik Bautz-Holter, Professor emeritus, UiO
- Helene Lundgaard Søberg, Professor, OsloMet
- Unni Sveen, Professor emeritus, OsloMet
- Tonje Haug Nordenmark, Associate Professor, UiO
- Marit V. Forslund, PhD, Postdoc, OUH
- Tanja Karic, PhD, Researcher, OUH
- Torgeir Hellstrøm, PhD, Researcher, OUH
- Ingerid Kleffelgård, PhD, Postdoc, OUH
- Mari S. Rasmussen, PhD, Postdoc, OUH
- Emilie I. Howe, PhD, Postdoc, OUH
- Silje Fure, PhD, OUH
- Elin Western, PhD, OUH
- Ida Maria Borgen Henriksen, PhD/postdoc, OUH/UiO
- Håkon Moksnes, PhD fellow, UiO
- Christoph Schäfer, PhD fellow, UiT
- Cathrine Buaas Tverdal, PhD, OUH
- Lars-Johan Viddal-Valaas, PhD fellow, UiO
- John Bjørneboe, PhD, Postdoc, OUH
- Benedikte Madsen, PhD fellow, UiO
- Camilla Guren Hovset, PhD fellow, UiO
- Joanna Nordhagen Selj, PhD fellow, UiO
- Vilde M. Danielsen PhD fellow, UiO

Research profile and aims

The research group generates knowledge about the mechanisms and consequences of trauma, patient care, trends and challenges in treatment and rehabilitation including the patients' healthcare needs.

The main research focus is traumatic injuries including traumatic brain injury (TBIs), multiple trauma and aneurysmal subarachnoid hemorrhage (aSAH). The research conducted by this group is multidisciplinary, where collaboration between genetics, intensive care medicine, neurosurgery, neuroradiology, neuropsychology, and rehabilitation professionals has been established over the last 17 years.

By combining the perspectives and methods of basal, clinical and health care service research, we may provide unique knowledge on the consequences of injuries, how to organize effective patient care and improve the functional outcomes after injuries.





The main aims of the research group for 2020-2025 are:

- To better understand the mechanisms, course and consequences of TBI, multiple traumas and aSAH by using translational research strategy
- To develop (and implement) cost-effective rehabilitation interventions to target TBI-related challenges in the short- and long-term after injury
- To improve collaboration and knowledge transfer between primary and secondary health care services to ensure seamless rehabilitation for trauma patients
- To strengthen existing and initiate new national and international research collaborations

Main ongoing projects

- Traumatic brain injury; needs and treatment options in the chronic phase. A randomized controlled community-based intervention.
Principal investigator: Cecilie Røe, PhD fellow Ida M. Borgen Henriksen, postdocs: Marit V. Forslund, Solveig L. Hauger, Ingerid Kleffelgård
- Rehabilitation needs, service provision and cost after trauma. In collaboration with the National Trauma Register, University Hospital of North Norway, and CHARM.
Principal investigator Nada Andelic, PhD fellows Håkon Moksnes and Christoph Schäfer, Postdoc Mari S. Rasmussen
- Sub-threshold training in patients with persistent post-concussion symptoms after mild TBI – a randomized controlled study.
Principal investigator: Ingerid Kleffelgård, PhD fellow Lars-Johan Viddal Valaas
- Changes in physical, cognitive and emotional functions 5 and 10 years after aneurysmal subarachnoid hemorrhage.
Principal investigators: Tonje Haug Nordenmark and Tanja Karic
- Exploring the role of personality characteristics in symptom-burden, return to work and health related quality of life during the first year after mild-to-moderate traumatic brain injury.
Principal investigators: Emilie I. Howe, PhD fellow Benedikte Madsen
- Traumatic Brain Injury – Rehabilitation and user satisfaction.
Principal investigators: Marit V. Forslund, PhD fellow Camilla Guren Hovset
- Trauma Rehabilitation: User experiences and Unmet Needs.
Principal investigator: postdoc Emilie I Howe
- Managing symptoms and disability in the sub-acute phase after traumatic injury: A pragmatic randomised controlled trial of a self-management support program.
Principal investigators: Nada Andelic, Solveig L. Hauger, Mari S. Rasmussen, PhD fellows Joanna Selj and Vilde Danielsen

Other projects

- OSU6162 in the treatment of fatigue and other neuropsychological sequelae after aneurysmal subarachnoidal hemorrhage - a double-blind, randomised, placebo-controlled study.
Principal investigators: Angelika Sorteberg and Tonje Haug Nordenmark. PhD Elin Western
- PRO-GLIO: PROton versus photon therapy in IDH-mutated diffuse grade 2 and 3 GLIOmas.
Principal investigator at OUH Petter Brandal, responsible for the neuropsychological part: Tonje Haug Nordenmark. Postdoc Ida M Borgen.





- Brain Health in female former football players. In collaboration with Norwegian School of Sport Sciences.
PhD fellow Sara Dahlén. Postdoc John Bjørneboe
- Effect of graded aerobic exercise in mild traumatic brain injury. In collaboration with Sunnaas Rehabilitation Hospital
Principal investigators: Marianne Løvstad and Nada Andelic, PhD fellow Lars Nysether
- Pediatric traumatic brain injury: A prospective study investigating incidence, outcomes and unmet treatments needs 2 years post-injury. In collaboration with Children Dept.
Principal investigators: Trond Diseth and Mia Myhre, PhD fellow Hilde M. Dahl
- Center-TBI (Collaborative European NeuroTrauma Effectiveness Research in TBI) is in publication phases.
Principal investigator at the OUH site: Nada Andelic

Most important national and international collaborators

National

- Oslo Traumatic Brain Injury Outcome and Rehabilitation Research Network (OBIOR- research network)
- Hospitals in the South-East Region, including Sunnaas Rehab. Hospital
- OsloMet
- Work Research Institute (AFI)
- Norwegian Labor and Welfare Administration, Oslo
- NAV, Dept. of vocational rehabilitation
- Universities of Oslo, Bergen, Trondheim and Tromsø
- Helsam/Charm, UiO
- Norwegian School of Sport Sciences

International

- Karolinska, Uppsala, Umeå and Salgrenska University Hospitals, Sweden
- Copenhagen University Hospital and Hammel Rehabilitation and Research Centre, Denmark
- Virginia Commonwealth University, Richmond, US
- BioCruces Health Research Institute, Spain
- University of California, San Diego, CA, USA
- University of Gottingen, Germany
- Hannover Medical School, Germany
- CENTER-TBI collaborators across the European hospitals/universities (particularly Finland, UK, France, Slovakia and Germany)
- Monash University, Australia
- Auckland University of Technology, New Zealand

Funding

- Norwegian Research Council
- Health Authority South-East Region
- Dam Foundation (Stiftelsen Dam)
- Norwegian Fund for Post-Graduate Training in Physiotherapy (Fysiofondet)
- European Union's Seventh Framework Programme for Research and Development
- University of Oslo
- Oslo University Hospital
- Norwegian Cancer Society
- Norwegian Health Association





Scientific production of the research group in 2023

Peer reviewed original research articles: >30 (including Center-TBI-publications)

Special issue in BMC Neurology

Invited symposium at international congresses 1; invited talks: 6

Selected publications:

Borgen IMH, Løvstad M, Hauger SL, Forslund MV, Kleffelgård I, Andelic N, Sveen U, Søberg HL, Sigurdardottir S, Winter L, Lindstad MØ, Brunborg C, Røe C (2023)

"Effect of an Individually Tailored and Home-Based Intervention in the Chronic Phase of Traumatic Brain Injury: A Randomized Clinical Trial"

JAMA Netw Open, 6 (5), e2310821. DOI 10.1001/jamanetworkopen.2023.10821, PubMed 37145600

Ghafaji H, Nordenmark TH, Western E, Sorteberg W, Karic T, Sorteberg A (2023)

"Coping strategies in patients with good outcome but chronic fatigue after aneurysmal subarachnoid hemorrhage"

Acta Neurochir (Wien), 165 (4), 1007-1019. DOI 10.1007/s00701-023-05549-y, PubMed 36912975

Moksnes HØ, Schäfer C, Rasmussen MS, Soberg HL, Røise O, Anke A, Røe C, Næss PA, Gaarder C, Helseth E, Dahl HM, Hestnes M, Brunborg C, Andelic N, Hellstrøm T (2023)

"Functional Outcomes at 6 and 12 Months Post-Injury in a Trauma Centre Population with Moderate-to-Severe Traumatic Injuries"

J Clin Med, 12 (16). DOI 10.3390/jcm12165300, PubMed 37629342





Painful musculoskeletal disorders



Group Leader

Cecilie Røe, Professor, Head of Dept of Physical Medicine and Rehabilitation,
UiO (cecilie.roe@medisin.uio.no)/ OUH (cecilie.roe@ous-hf.no)

Group Members

- Erik Bautz-Holter, Professor emeritus, UiO
- Siri Bjorland, PhD, OUH
- Jens Ivar Brox, Professor, UiO
- John Bjørneboe, PhD, OUH
- Kaia Beck Engebretsen, PT, PhD, OUH
- Marte Heide, PhD student, UiO
- Marianne Bakke Johnsen, PhD, UiO
- Niels-Gunnar Juel, MD, Dr. Philos, OUH
- Synnøve Kvalheim, PhD, OUH
- Kjersti Myhre, PhD, OUH
- Marianne Mørk, PhD student, OUH
- Elina Schistad, PhD, OUH
- Helene Skaara, MSc, OUH
- Sigrid Skatteboe, PhD, OUH
- Håkon Sveinall, PhD student, OUH
- Thy Vanem, PhD, OUH
- Mirad Taso, PhD student, OUH
- Thy Vanem, PhD student, OUH

Research profile and aims

The research unit generates knowledge regarding diagnostics, treatment and rehabilitation of painful musculoskeletal conditions. The main focus is on neck, back and shoulder conditions. The research is multidisciplinary, and collaboration with basal, clinical and health care service milieus established. Based on the framework of the International Classification of Functioning, Disability and Health (ICF) and the biospsychosocial model, interaction between the genetic and other basal disease mechanisms with psychosocial, personal and environmental factors are studied regarding the course of pain, functioning and participation. Furthermore, developing and evaluating treatment models in prospective and randomized studies, aiming to improve functioning and return to work are focus areas.

The main aims are:

- To understand the mechanisms, course and consequences of painful musculoskeletal conditions
- To develop and evaluate treatment models for painful musculoskeletal conditions





Ongoing projects

- A randomized controlled study of surgical versus non-surgical treatment for cervical radiculopathy.
Principal investigator Jens Ivar Brox, PhD fellow Mirad Taso
- The effectiveness of radial extracorporeal shockwave therapy, standardized exercise program or usual care for patients with plantar fasciopathy.
PhD fellows Marianne Mørk and Marte Heide
- The Norwegian Tennis Elbow (Note) study.
Principal investigator Marianne Bakke Johnsen, PhD fellow Håkon Sveinall
- Effect of a self-management program compared to treatment as usual for patients with lateral hip pain.
Principal investigators Marianne Bakke Johnsen and John Bjørneboe. PhD candidates Thea Morin Melås and Maren Wefring
- Development of a minimum reporting set for rehabilitation services.
Principal investigator Cecilie Røe
- Multidisciplinary treatment of patients with neck and back pain with immigrant background.
Principal investigator John Bjørneboe

Most important national and international collaborators

National

- Dept. of Orthopaedics, OUh
- Research Unit for Musculoskeletal Health, FORMI, OUh
- Institute of Health and Society, UiO
- Dept. of Physical medicine and Rehabilitation, St Olavs Hospital
- Dept. of Physical medicine and Rehabilitation, University Hospital of North Norway
- Dept. of Physical medicine and Rehabilitation, Haukeland University Hospital

International

- Christoph Gutenbrunner, Hannover Medical School, Department of Rehabilitation Medicine, Hannover, Germany
- Michael Rathleff, Dept of Health Sciences and Technology, Aalborg University, Denmark
- Juan Lu, Paul Perrin, Virginia Commonwealth University, US

Funding

- The Research Council of Norway
- South-Eastern Norway Regional Health Authority
- Sofies Minde Ortopedi
- Oslo University Hospital





Scientific production of the research group in 2023

Peer reviewed original research articles: 17

Selected publications:

Heide, Marte; Mørk, Marianne; Hoksrud, Aasne Fenne; Brox, Jens Ivar; Røe, Cecilie
"Responsiveness of specific and generic patient-reported outcome measures in patients with plantar fasciopathy"
Disabil Rehabil. 2023 Oct 19:1-7. doi: 10.1080/09638288.2023.2267438

Mørk M, Soberg HL, Hoksrud AF, Heide M, Groven KS
"The struggle to stay physically active-A qualitative study exploring experiences of individuals with persistent plantar fasciopathy"
J Foot Ankle Res. 2023 Apr 15;16(1):20. doi: 10.1186/s13047-023-00620-4.PMID: 37061709

Sveinall, Håkon; Wenstad, Per Kristian; Fearon, Angela M.; Skyttemyr, Gjermund; Thornes, Elisabeth; Skaara, Helene Engberg; Juel, Niels Gunnar; Brox, Jens Ivar; Røe, Cecilie; Johnsen, Marianne Bakke
"The reliability and validity of the Norwegian version of the Victorian Institute of Sports Assessment for gluteal tendinopathy questionnaire (VISA-G-Norwegian) for patients with greater trochanteric pain syndrome"
BMC Musculoskeletal Disorders 2023; Volume 24





Department of Refractory Epilepsy - National Centre for Epilepsy

The National Centre for Epilepsy at OUS is the only tertiary epilepsy centre in Norway and offers highly specialized work-up and treatment for complex and refractory epilepsy. The Centre is a full member of the ERN EpiCare and has members in several committees and the Executive Committee.

The Centre provides comprehensive care and has national responsibilities for complex epilepsy, rare epilepsy, pre-surgical work-up, epilepsy surgery and post-surgical work-up in collaboration with the Department of neurosurgery, OUS, psychogenic non-epileptic seizures (PNES) and dietary treatment.

The research group at the centre includes MDs, PhDs, epilepsy nurses, pharmacist, psychologists, and clinical nutritionists. The focus is on genotype/phenotyping of epilepsies, characterization of different epilepsy syndromes, clinical pharmacology of antiseizure medication, diagnostic and treatment options; EEG, epilepsy surgery, VNS, diets, psychosocial issues, cognition and PNES.

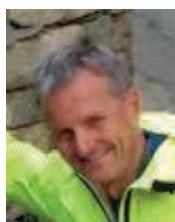
All patients are included in the hospital quality registry, also used for research purposes, consent provided.

The department of Refractory Epilepsy is headed by Grete Almåsbak.





Complex epilepsy



Group Leader

Morten I. Lossius, Consultant neurologist, National Centre for Epilepsy (NCE),
OUH (mortenl@ous-hf.no) and Professor, UiO
(morten.lossius@medisin.uio.no)

Group Members

- Marit Bjørnvold, MD/PhD, NCE
- Cecilie Johannessen Landmark, MSc/PhD, NCE and OsloMet
- Kristin Alstad, MD/PhD, NCE
- Karl Otto Nakken, MD/PhD, NCE
- Magnhild Kverneland, MSc/PhD, NCE
- Kari Modalsli Aaberg, MD/PhD, NCE
- Hilde Karterud, Cand.san/PhD, NCE
- Oliver Henning, MD, Dr. Philos., NCE
- Erik Sætre, MD/PhD, NCE
- Annette Holth Skogan, Clin. Neuro. Psych/PhD, NCE
- Lisa E. Hauger, Clin. Psych./PhD, NCE
- Silje Alvestad, MD/PhD, NCE
- Sigrid Pedersen, MSc, PhD, NCE
- Torleiv Svendsen, MD, PhD, NCE and UiO

PhD candidates

- Antonia Villagran, MD, NCE and UiO
- Eli B. Kyte, Clin. Neuro. Psych, NCE and UiO
- Rune Markhus, MD, NCE
- Ellen Molteberg, MD, NCE and UiO
- Konstantin H. Kostov, MD, NCE and UiO
- Gernot Hlauscek, MD, NCE and UiO
- Merete Tschamper, MSc, NCE and UiO
- Truls Vikin, MD, NCE and UiO
- Fridny Heimisdottir, MD, NCE and UiO

Associated group members

- Anette Huuse Farmen, MD/PhD, Innlandet Hospital Trust and UiO
- Marte Syvertsen, MD/PhD, Vestre Viken Hospital Trust and UiO
- Kaja Kristine Selmer, MD/PhD, OUH and UiO
- Ine Cockerell, MSc, OUH and UiO
- Margrete Larsen Burns, MD, PhD, Dept. of Pharmacology, NCE, OUH





Research profile and aims

Clinical research in patients with difficult-to-treat epilepsy, with particular focus on:

- Characterization of epilepsy syndromes (genotype/phenotype)
- Clinical pharmacology of antiseizure medications
- Diagnostic and treatment options; EEG, pharmacotherapy, surgery, VNS, ketogenic diets
- Psychosocial, psychiatric and neurocognitive aspects
- Psychogenic non-epileptic seizures

Dissertation 2023

Sigrid Pedersen:

"Dietary treatment in children and adults with drug resistant epilepsy"

Supervisor: Kaja Selmer. Co-supervisors: Knut Rudi, Per Ole Iversen and Benedicte Alexandra Lie

Ongoing projects

PhD candidates in the UiO PhD program:

- **Antonia Villagran:** *"Psychiatric comorbidity in patients with psychogenic non-epileptic seizures (PNES)"* Supervisor: Morten I. Lossius. Co-supervisor: Roderick Duncan
- **Ellen Molteberg:** *"Long term effects of modified Atkins diet in therapy-resistant epilepsy"* Supervisor: Erik Taubøll. Co-supervisors: Per Medbøe Thorsby and Karl O. Nakken
- **Eli B. Kyte:** *"Impact of epilepsy surgery on cognition, psychiatry and quality of life at the commencement of aging"* Supervisor: Kristin Å. Alfstad. Co-supervisors: Morten I. Lossius and Annette H. Skogan
- **Merete Tschamper:** *"Childhood epilepsy and parental health literacy"* Supervisor: Marie Hamilton Larsen. Co-supervisors: Astrid K. Wahl and Rita Jakobsen
- **Konstantin H. Kostov:** *"Clinical outcomes and determinants of effectiveness of vagus nerve stimulation in a large national refractory epilepsy population"* Supervisor: Morten I. Lossius, Co-supervisor: Jukka Peltola
- **Gernot Hlauschek:** *"Identifying novel imaging and clinical biomarkers of epileptogenesis poststroke"* Supervisor: Morten I. Lossius, Co-supervisors: Patrick Kwan and Meng Law
- **Truls Vikin:** *"Epilepsy in children-how are they doing?"* Supervisor: Kari M. Aaberg, Co-supervisors: Pål Surén and Morten I. Lossius
- **Guro Minken:** *«Betre monitorering ved vakenkraniotomiar for pasientar operert for hjernesvulstar»* Supervisor: Annette Holth Skogan. Co-supervisoer: Einar Osland Vik-Mo, Andreas Espinoza, Awais Mughal Ahmad
- **Fridny Heimisdottir:** *"Genetic mosaicism in focal epilepsy. Creating a platform for precision medicine in mosaic disorders"*. Supervisor: Kaja K. Selmer, Co-supervisors: Kristin Å. Alfstad, Inger-Lise Mero





Postdoc:

- Silje Alvestad: "Scandinavian multi-registry study of antiepileptic drug teratogenicity: The SCAN-A study". Co-workers: Marte Bjørk, Torbjørn Tomsen and Jacob Christensen
- Kari M. Aaberg: «Development in childhood epilepsy». Co-worker: Morten I. Lossius
- Hilde Nordahl Karteud: "A follow-up of adolescents with psychogenic non-epileptic seizures (PNES)"
Co-workers: Merete Tschamper and Oliver Henning

Other projects:

- **Kristin Å. Alfstad:** "Risk factors for psychiatric symptoms and executive problems in youth with epilepsy"
Co-worker: Morten I. Lossius
- **EpilepsiNett:** «Kan vi tette gapet? Sosioøkonomiske forskjeller og helseulikhet hos unge med epilepsi.
Et EpilepsiNett prosjekt med data fra registre, kliniske cohorted og brukerstyrt oppfølging»
Kristin Å. Alfstad, Kari M. Aaberg, Marte Bjørk, Marte Roa Syversen, Eline Dahl-Hansen, Maryam Shirzadi, Jeanette Koht
- **Magnhild Kverneland:** "Who should be treated with ketogenic diet for epilepsy"
Co-worker: Kaja K. Selmer
- **Erik Sætre:** "Mortality in Epilepsy"
Co-worker: Michael Abdelnoor
- **Lisa Evju Hauger:** "Tilpasset fMRI protokoll for barn, unge og voksne med uttalt kognitiv svikt "
Co-workers: Annette Holth Skogan and Markus H Sneve
- **Lisa Evju Hauger:** "EpiTrack jr., kvalitetssikringsstudie"
Co-workers: Morten I. Lossius, Annette H. Skogan, Kari M. Aaberg
- **Halvor Torgersen:** "EpiTrack, kvalitetssikringsstudie "
Co-worker: Annette H. Skogan
- **Guro Minken:** «Protokoll for språkmonitorering under våkenkirurgi, barn».
Co-workers: Annette H. Skogan, Fridny Heimisdottir, Ingeborg Ribu, Silje Systad, Christiane Sørensen, DuLIP gruppen.
- **Kathrine C. Haavardsholm:** "Long term effect of ketogenic diet in children with epilepsy"
Co-workers: Anette Ramm-Pettersen, Kaja K. Selmer, Mahtab Zamani, Karolina Skagen, Mona Skjelland

PhD-candidates associated to the group

- **Ine Cockerell:** "Treatment and follow-up in patients with tuberous sclerosis"
Supervisor: Terje Nærland. Co-supervisor: Cecilie J. Landmark and Ketil Heimdal





National network

- EpilepsiNett: National Network for Evidence-based Epilepsy Care
Chairperson: Marte Syversen. Management team: Morten I. Lossius, Nils Erik Gilhus, Marte Bjørk, Kristin Å. Alfstad, Jørn Mandla Sibeko

International networks

- EpiCARE; European Reference Network (ERN) on rare and complex epilepsies. Lead of working group 18 and executive committee member: Morten I. Lossius
- BIOJUME – the biology of juvenile myoclonic epilepsy. Members of consortium: Marte Syvertsen and Kaja Selmer

International projects

- “EURAP study”. An International Antiepileptic Drugs and Pregnancy Registry” (International concerted Action on the Teratogenesis of Anti-epileptic Drugs) (<https://eurapinternational.org/>)
Silje Alvestad and **Siri Myklebust**, national coordinators
- “Computer based identification of morphometric abnormalities in MRI images in patients before and after operation in the temporal lobe.” **Kristin Å. Alfstad**, **Morten I. Lossius**, Jugoslav Ivanovic, Pål Bache Marthinsen, OUH and Lars Pinborg, Copenhagen University Hospital, Denmark
- “Detection and classification of seizures with wearable sensors-new technology in the diagnosis of epilepsy”. **Kristin Å. Alfstad**, **Antonia Villagran**, **Rune Markhus** and Kristina Malmgren, University of Gothenburg and Sahlgrenska University Hospital, Sweden
- “Ultra-long subcutaneous EEG monitoring: reliability, safety and impact on clinical management in uncontrolled epilepsies.” **Kristin Å. Alfstad**, **Oliver Henning**, **Margrete Halvorsen Bø**, Arild Egge, OUH, Guido Rabboli, University of Copenhagen, Danish Epilepsy Centre, Dianalund, Denmark and Sándor Benizky, Aarhus University Hospital and Danish Epilepsy Centre, Dianalund, Denmark.
- “Nordic prospective observational study of outcomes after rare epilepsy surgery procedures”. **Fridny Heimisdottir**, **Kristin Å. Alfstad** and Tove Hallbook, University of Gothenburg and Sahlgrenska Hospital, Sweden
- “Children with refractory epilepsy and use of the newest antiepileptic drugs”. Scandinavian project between the National Centre for Epilepsy in Norway and Danish Epilepsy Centre, Dianalund, Denmark. **Margrete Larsen Burns**, Marina Nikoronova, Danish Epilepsy Centre, Dianalund; responsible in Denmark, **Cecilie Johannessen Landmark**, project leader
- “Nordic Delphi Consensus on VNS guidelines”
An international multicenter project. The aim of the project is to find Consensus for mutual clinical VNS guidelines in the Nordics for drug resistant epilepsy patients
Norway: **Oliver Henning**, project leader, **Hrisimir Kostov**, Thorsten Gerstner, Stein-Helge Tingvoll, Susanne Ingebrigtsen, Atle Lillebø, Omar Hikmat
Denmark: Dragan Marsanovic, Kern Olofsson, Anne Sabbers, Ioannis Tsironopoulos, Noemi Becser Andersen
Finland: Liisa Metsähonkala, Reina Roivainen, Salla Lamouso, Jukka Peltola





Sweden: Sintia Kolbjer, Lisa Gordon, Helena Gauffin, Johan Lundgren, Elinor Ben-Menachem, Fredrik Asztely

- “EEG in Nodding Syndrome (Onchocerca volvulus associated epilepsy).” **Oliver Henning**, Richard Idro, Makarere University, Kampala, Uganda

Expert groups and international commissions

- NorEpiNet; **Kathrine Cammermeyer Haavardsholm, Magnhild Kverneland**
- EpiCARE – Special Interest group on Ketogenic Diet; **Ellen Molteberg, Magnhild Kverneland**
- ILAE Dietary Task Force of the medical Therapies Commission; **Magnhild Kverneland**
- Cannabidiol International Expert group (CBD). **Cecilie Johannessen Landmark**
- Treatment strategies on pediatric epilepsies annual educational course
<https://www.epiped-course.com> (EpiPed.) **Cecilie Johannessen Landmark**
- Epilepsy Education Task Force, Botanical Medicines Task Force and Pediatric treatment task force, all initiated by the International League Against Epilepsy (EpiED) **Cecilie Johannessen Landmark**
- Faculty member, Eilat Educational course: Pharmacological treatment of epilepsy **Cecilie Johannessen Landmark**
<https://www.ilae.org/congresses/10th-eilat-educational-course-pharmacological-treatment-of-epilepsy>
- Faculty member, annual course Baltic sea summer school for epilepsy: **Oliver Henning** and **Cecilie Johannessen Landmark**
<https://www.ilae.org/congresses/ilae-sponsored-meetings-and-courses/baltic-sea-summer-school-on-epilepsy-bssse>
- Nordic Expert Group on Epilepsy and Dementia. **Erik Sætre**
- Nor-EpiNet Nordic network for precision medicine, steering group members **Kaja Selmer** and **Cecilie Johannessen Landmark**
- Commission on Epidemiology, International League Against Epilepsy. **Kari Modalsli Aaberg**

Most important national and international collaborators

National

- Førsteam. Maryam Shirzadi, St. Olavs Hospital and NTNU, Trondheim
- Prof. Erik Taubøll, OÜH and UiO
- Prof. Jeanette Koht, Viken Hospital Trust and UiO
- Prof. Nils Erik Gilhus, Haukeland University Hospital and UiB
- Ass. prof. Marte Bjørk, Haukeland University Hospital and UiB
- Marte Syvertsen, MD, PhD, Viken Hospital Trust and UiO

International

- Prof. Torbjörn Tomson, Karolinska Institute, Stockholm, Sweden
- PhD Jacob Christensen, University of Århus, Denmark
- Prof. Marina Nikoronova, Danish Epilepsy Centre, Dianalund, Denmark
- Prof. Anne Sabers, University of Copenhagen, Denmark
- Lars Pinborg, Copenhagen University Hospital, Denmark
- Prof. Richard Chin, Muir Maxwell Epilepsy Centre and University of Edinburgh, UK
- MD Roderick Duncan, MD, DB Medical Research Centre, Christchurch, New Zealand





- Prof. Christoph Helmstaedter, Bonn University Hospital, Germany
- Prof. Jukka Peltola, Tampere University Hospital, Finland
- Prof. Sándor Beniczky, Danish Epilepsy Centre, Dianalund, University of Århus, Denmark
- Prof. Guido Rubboli, Danish Epilepsy Centre, Dianalund, University of Copenhagen, Denmark
- Ass. Prof. Rikke Steensbjerre Møller, University of Southern Denmark, Denmark
- Prof. Deb Pal, King's College, London, UK

Scientific production of the research group in 2023

Peer reviewed original research articles: 30

Other publications: 9

Selected publications:

Kverneland M, Nakken KO, Hofoss D, Skogan AH, Iversen PO, Selmer KK, Lossius MI (2023)
“Health-related quality of life in adults with drug-resistant focal epilepsy treated with modified Atkins diet in a randomized clinical trial”
Epilepsia, 64 (5), e69-e74

Molteberg E, Thorsby PM, Kverneland M, Iversen PO, Selmer KK, Hofoss D, Nakken KO, Taubøll E (2023)
“Stress biomarkers in adult patients with drug-resistant epilepsy on a modified Atkins diet: A Prospective Study”
Epilepsia Open, 8 (4), 1331-1333

Pedersen S, Kverneland M, Rudi K, Gervin K, Landmark CJ, Iversen PO, Selmer KK (2023)
“Decreased serum concentrations of antiseizure medications in children with drug resistant epilepsy following treatment with ketogenic diet”
Epilepsia Open, 8 (3), 858-866

Funding

- South-Eastern Norway Regional Health Authority: 1 PhD, 1 postdoc 6 years
- Norwegian Foundation for Health and Rehabilitation (Stiftelsen Dam): 3 PhDs

Other financial support:

- Norwegian chapter of ILAE
- Norwegian Epilepsy Society
- National National Advisory Unit on Rare Diseases





Department of Neurosurgery

The department of Neurosurgery treats adults and children with traumatic brain injury, spontaneous intracranial hemorrhages, intracranial tumors, hydrocephalus, epilepsy, congenital malformations in the central nervous system, degenerative brain diseases, degenerative spinal disease, intraspinal tumors and cervical spine injuries.

The department has regional responsibility for neurosurgery in Helse Sør-Øst with 3.1 million people, and national functions in craniofacial surgery, epilepsy surgery, and surgery for cerebral vascular malformations. In addition, the department has multi-regional functions for pediatric neurosurgery and Parkinson's surgery.

The department of Neurosurgery is headed by Professor Eirik Helseth.





Neurovascular–Cerebrospinal Fluid Research Group



Group Leader

Per Kristian Eide, Professor, Dept of Neurosurgery, UiO (p.k.eide@medisin.uio.no)/
Head of Section, Dept of Neurosurgery, OUH (peide@ous-hf.no)

Group Members

- Aukrust, Camilla Grøver, PhD fellow UiO
- Dahlberg, Daniel, PhD, OUH
- Eide, Per Kristian, group leader
- Fric, Radek, PhD, OUH
- Lashkarivand, Aslan, PhD fellow, UiO
- Langvatn, Erlend, Consultant, OUH
- Quesada, Cesar Luis Vera, PhD fellow, UiO
- Sorteberg, Angelika, professor, UiO / Consultant OUH
- Sorteberg, Wilhelm, dr.med., OUH
- Romundstad, Luis, Consultant, OUH
- Rønning, Pål Andre, PhD, consultant, OUH
- Valnes, Lars-Magnus, PhD, Postdoc, OUH
- Wiedmann, Markus, PhD, Consultant, OUH

Research profile and aims

The Neurovascular & Cerebrospinal Fluid Research Group teams up with a multidisciplinary group of neurosurgeons and neuroscientists, mathematicians, PhD candidates, postdocs and students, to provide a broad collaboration with a common vision; to challenge, discover and improve our current understanding and treatment of complex neurovascular and cerebrospinal fluid (CSF) disorders. We address the close interaction between the cerebral vasculature and the CSF, which we consider to have major impact on cerebral metabolism and metabolic failure. The group has a translational perspective with a strong clinical basis.

From the clinical perspective, the following diseases and disease states are targeted:

- Intracranial aneurysms and subarachnoid hemorrhage, including neuro-intensive surveillance and outcome. Cerebral hemodynamics and cerebral revascularization. Pathophysiology and treatment of chronic subdural hematomas.
- Cerebrospinal fluid diseases and role of cerebrospinal fluid in metabolic function of central nervous system, particularly in neurodegeneration and dementia, CSF disturbances, vascular disease and cerebral bleeds, inflammatory disease and neuro-oncology.
- Neuro-inflammatory conditions, particularly related to neurosurgical diseases.
- Brain Monitoring. Neurosurgical pathophysiology, intracranial pressure and arterial blood pressure dynamics.





Ongoing projects

- **Cerebrospinal fluid**

Efflux pathways. Glymphatic function. Meningeal lymphatic function. Imaging of CSF flow and CSF tracer transport, and CSF molecular clearance function. Pathophysiology of CNS diseases with CSF disturbance: Hydrocephalus. Normal pressure hydrocephalus. Idiopathic intracranial hypertension. Spontaneous intracranial hypotension. Idiopathic CSF obstruction from cysts. Chiari malformation.

- **Neurovascular**

Subarachnoid hemorrhage: Bleeding risks. Complications (Vasospasms. Hydrocephalus. Fatigue). Rehabilitation. Outcome. Vascular compression syndromes. Trigeminal neuralgia.

- **Neuro-inflammation**

Cerebral abscesses: Pathophysiology. Subdural hematoma: pathophysiology and role of neuroinflammation.

- **Brain monitoring**

Invasive and non-invasive intracranial pressure (ICP).

Most important national and international collaborators

National

- Simula Research Laboratory, UiO
- Dept of Physical Medicine and Rehabilitation, OUH
- Dept of Radiology, OUH
- The Intervention Centre, OUH
- Dept of Informatics, UiO
- Dept of Mathematics, UiO
- Dept of Neurology, OUH
- Division of Emergencies and Critical Care, OUH
- Sunnaas Rehabilitation Hospital
- Institute of Basic Medical Sciences, UiO

International

- University of Gothenburg, Sweden
- University of Kupio, Finland
- University of Copenhagen, Denmark

Funding

- South-Eastern Norway Regional Health Authority
- European Union





Scientific production of the research group in 2023

Peer reviewed original research articles: 31

Invited lectures at international congresses: >10

Selected publications:

Dahlberg D, Holm S, Sagen EML, et al.

"Bacterial Brain Abscesses Expand Despite Effective Antibiotic Treatment: A Process Powered by Osmosis Due to Neutrophil Cell Death"

Neurosurgery. Dec 12 2023;94 (5):1079-87. doi:10.1227/neu.0000000000002792

Eide PK, Lashkarivand A, Pripp A, et al.

"Plasma neurodegeneration biomarker concentrations associate with glymphatic and meningeal lymphatic measures in neurological disorders"

Nature communications. Apr 12 2023;14 (1):2084. doi:10.1038/s41467-023-37685-5

Vera Quesada CL, Rao SB, Torp R, Eide PK.

"Immunohistochemical visualization of lymphatic vessels in human dura mater: methodological perspectives"

Fluids and barriers of the CNS. Mar 28 2023;20 (1):23. doi:10.1186/s12987-023-00426-3





Oslo Neurosurgical Neurotrauma Group



Professor Eirik Helseth, MD/PhD, Consultant neurosurgeon, Dept. of Neurosurgery, OUH (eirik.helseth@ous-hf.no) and Professor of Neurosurgery, Faculty of Medicine, UiO (eirik.helseth@medisin.uio.no)

Group Members

- Mads Aarhus, MD/PhD, OUH
- Hege Linnerud, MD/PhD, OUH
- Jon-Terje Ramm-Pettersen, MD/PhD, OUH
- Pål Rønning, MD/PhD, OUH
- Tor Brommeland, MD/PhD, OUH
- Markus Wiedmann, MD/PhD, OUH
- Ali Rizvi, MD/PhD, OUH
- Cathrine Buaas Tverdal, PhD, OUH
- Dag Ferner Netteland, MD/PhD fellow
- Ingar Næss, MD, PhD fellow, UiO
- Pål Galteland, MD/PhD fellow
- Mats Døving, MD/PhD fellow
- Anamaria Gheorghiu, MD/PhD fellow
- Pål N F Rydning, MD
- Thomas Glott, MD, Sunnaas Hospital
- Mona Strøm, Sunnaas Hospital

Research collaboration

- Einar Vik-Mo, MD/PhD, Department of Neurosurgery, OUH
- Erik Taubøll and Hild Sødal, Department of Neurology, OUH
- Nada Andelic, Department of Physical Medicine and Rehabilitation
- Marianne Løvstad, Department of Research, Sunnaas Rehabilitation Hospital
- Leiv Arne Rosseland, MD/PhD, IPOT-NTR
- Petter Brandal MD/PhD, Department of Oncology, OUH
- Hanne Blakstad MD/PhD fellow, Department of Oncology, OUH

Research profile and aims

Main focus on surgical complications and outcome after surgery for:

- Neurotrauma
- Traumatic brain injury
- Cervical spine injury
- Bicycle related injuries
- Brain tumors





Ongoing projects 2023

- Cervical trauma – Epidemiology and Surgical management
- Cervical spinal cord injury – Epidemiology, time to surgery and specialized rehabilitation
- Traumatic Brain Injury – Epidemiology and management
- Association of lifestyle, anthropometric and metabolic factors with risk for primary central nervous system tumors
- CenterTBI – European study
- Transocular ultrasound for ICP measurement – with SINTEF/Nisonic

PhD projects

- Transocular ultrasound for ICP measurement - Dag Ferner Netteland
- Bicycle-related facial fractures – Pål Galteland
- Bicycle-related accidents – Ingar Næss
- Bicycle accidents – Mats Døving
- Brain tumor epidemiology - Anamaria Gheorghiu

Funding

South-Eastern Norway Regional Health Authority

Scientific production of the research group in 2023

Peer reviewed original research articles: 15 (including Center TBI-publications)

Invited lectures at international congresses: 2

Prospective quality control databases

- Brain tumors – surgery OUH (400 per year)
- Traumatic Brain Injury – TBI patients admitted OUH with positive head CT (400 patients per year)
- Cervical fractures in Southeast Norway (500 per year)





Selected publications:

Netteland DF, Sandset EC, Mejlænder-Evjensvold M, Aarhus M, Jeppesen E, Aguiar de Sousa D, Helseth E, Brommeland T.

"Cerebral venous sinus thrombosis in traumatic brain injury: A systematic review of its complications, effect on mortality, diagnostic and therapeutic management, and follow-up"

Front Neurol. 2023 Jan 9;13:1079579. doi: 10.3389/fneur.2022.1079579. eCollection 2022.

PMID: 36698879

Galteland P, Næss I, Døving M, Sehic A, Utheim TP, Skaga NO, Eken T, Helseth E, Ramm-Pettersen J.

"Facial Fractures and Their Relation to Head and Cervical Spine Injuries in Hospitalized Bicyclists"

J Craniofac Surg. 2023 Jan-Feb 01;34(1):34-39. doi: 10.1097/SCS.00000000000009032. Epub 2022 Dec 30.

PMID: 36608095

Netteland, DF, Aarhus M, Smistad E, Sandset EC, Padayachy L, Helseth E, Brekken R.

"Noninvasive intracranial pressure assessment by optic nerve sheath diameter: Automated measurements as an alternative to clinician-performed measurements"

Front Neurol. 2023 Feb 1;14:1064492. doi: 10.3389/fneur.2023.1064492. eCollection 2023.

PMID: 36816558 Free PMC article.





Vilhelm Magnus Laboratory for Neurosurgical Research



Group Leader

Einar O. Vik-Mo, MD/PhD, Professor, Dept of Neurosurgery, UiO /Dept. of Neurosurgery, OUH (UXVIEB@ous-hf.no)

Group Members

- Cecilie J. Sandberg, MSc/PhD, unit leader
- Iver A. Langmoen, dr. med, professor emeritus
- Skarphedinn Halldorsson, MSc/PhD, researcher
- Awais Mughal, MD/PhD, research fellow
- Erlend Skaga, MD/PhD, research fellow
- Emily Palmero, BSc
- Zanina Grieg, MSc
- Richard Nagymihaly, MSc/PhD
- Lance J.L. Estabillo, MSc, PhD-student
- Marit Brynjulvsen, MSc, PhD-student
- Eduardo Mendoza, MD, PhD-student

Associated researchers from other departments

- Henning Leske, neuropathologist, Dept. of Pathology
- Rebecca R. Winther, MD, PhD-student, Dept. of Oncology

Research profile and aims

The Vilhelm Magnus laboratory focuses on translational research to understand underlying mechanisms in neurosurgical diseases and improve diagnostics and treatment for these.

In recent years, the focus has been on molecular and cell biology methods, combined with animal models, to better understand brain cancer.

Two clinical intervention studies, originating from the laboratory, are ongoing. These studies seek to improve the prognosis for patients with glioblastoma (GBM), the most frequent and deadly brain cancer (median survival in unselected series < 1 year) (Skaga et al., Neurooncol Adv. 2021). From 2008-2015 we performed the first clinical protocol targeting stem cells in a solid tumor - an autologous vaccine against GBM stem cells. Evolving from this first study, we are now since 2018 conducting a randomized study evaluating this immunotherapy approach (DEN-STEM). In addition, we are exploring an individualized systems medicine strategy, in which we test > 500 drugs against tumor stem cells from individual patients. The latter is also the first study of its kind in any type of solid tumor.

The Vilhelm Magnus Laboratory is a section within the Department of Neurosurgery.





Ongoing projects

Two decades ago the Vilhelm Magnus Laboratory demonstrated, for the first time, that stem cells from the adult human brain can differentiate into functional neurons, and that it is possible to generate a small nervous system with numerous neurons that fire action potentials and communicate via synapses, from a single stem cell, harvested from the adult human brain (Moe et al Brain, 2005, Westerlund et al Exp Cell Res. 2003, Moe et al Neurosurgery 2005).

Simultaneously we started to grow cells from GBMs. A population of cells from these tumors turned out to have stem cell-like properties. Through extensive comparisons between GSCs and normal stem cells from the adult brain (Varghese et al Neurosurgery 2008), we identified genes and pathways which are dysregulated in GSCs and provided the first clinical dataset that support the cancer stem cell hypothesis in glioblastoma (Sandberg et al, Exp Cell Res, 2013).

We further showed that a GBM can only be transferred from one animal to another by transplantation of cells from the GSC subpopulation, in keeping with other results indicating that it is this subpopulation that is responsible for recurrence, growth and drug resistance. We have, therefore, characterized GSCs quite extensively (Varghese et al Neurosurgery. 2008, Vik-Mo et al, Neuro Oncol, 2010, Vik-Mo et al, Exp Cell Res, 2011, Joel et al, Dev Dyn, 2013, Sandberg et al, Exp Cell Res, 2013, Fayzullin et al Exp Cell Res. 2016, Mughal et al, Neoplasia 2018).

Development of a stem cell-based vaccine in patients with brain cancer

We developed the first clinical protocol which targeted stem cells in a solid tumor by transducing dendritic cells from patients with mRNA from their own GBM stem cells. This significantly improved clinical outcome (Vik-Mo et al, Cancer Immunol Immunother. 2013). Two out of the 21 treated patients are still alive more than ten years after their diagnosis of GBM.

A randomized trial of the vaccine was certified by all required authorities and started in the spring of 2018. This study is currently including patients. Our intention in the current study is also to clarify why some patients respond and others do not; by in-depth studies of individual tumors and treatment responses.

Individualized systems medicine strategy to target GSCs in patients with recurrent glioblastoma

In collaboration with our partners at the Finnish Institute for Molecular Medicine, we are combining the novel technical possibilities of high-throughput screening and deep sequencing with our established know-how on patient specific tumor stem cell cultures. Exploring a panel of 525 drugs established in clinical use, as well as drugs in early-phase development, at five different concentrations, we have screened stem cells from individual tumors for drug sensitivity. The approach has been coined Individualized Systems Medicine.

This study has shown that GBMs from individual patients are very heterogenous with respect to drug sensitivity (Skaga et al. 2019). In 2023 we published the first study exploring the intratumoral heterogeneity (Bryjulvsen et al. 2023). A clinical early phase trial for feasibility evaluation of this strategy (ISM-GBM) started patient inclusion in 2023.

Characterization of invasive GCSs at the single cell level

Glioblastomas are characterized by diffusely infiltrative growth. To investigate the invasive properties of glioblastoma cells we film cells while they invade into rodent brain slices or 3D-biomatrixes using time-lapse microscopy. We have identified subpopulations of cells with different invasive potentials. These cells display specific movement patterns and morphology (Fayzullin et al. 2019).





We are now developing this strategy further to encompass functional characteristics combined with time-lapse microscopy. This in collaboration with Krister Wennerberg at Copenhagen University.

Molecular targeting of cancer stem cells in glioblastoma

By performing a systematic comparison of gene expression in adult human neural stem cells and GSCs, we have identified differentially expressed genes that may have the potential as new and specific targets for treatment of glioblastoma. Our results from exploring several of these genes and pathways in-depth, suggest a functional role for the Wnt signaling pathway (Kierulf-Vieira KS et al.2020), PBK and NAT12/NAA30 in GBM. As a strategy to more efficiently and directly identify targets that are likely to trigger a therapeutic response, we are currently focusing on genetic high throughput loss-of function screening as tools to identify both individual and shared target hits in patient derived GSC cell cultures.

The molecular basis for tissue stiffness in glioblastoma

Magnetic resonance imaging elastography is a novel imaging modality with the potential to preoperatively identify surgical risk by evaluating tumor stiffness. Through a collaboration with Dept. of Diagnostic Physics, we are further exploring the molecular basis for MRI heterogeneity in glioblastoma (Svensson, Halldorsson et al., 2022 & 2023).

A molecular pipeline for individualized treatment in pediatric brain cancers

Brain cancer is the most common cancer in children. We are exploring the use of rapid molecular characterization using Nanopore technology combined with stem cell biology and high throughput drug-screening to develop better individualized treatment strategies. In our recent publication, we demonstrate how this method can lead to sensitive, robust, and rapid intraoperative molecular classification of brain tumors (Djirackor et al. 2022). The project was highlighted as the first main hall lecture on the “London Calling Conference 2021”.

Real-world data of clinical outcome for patients operated for brain tumors

Based upon the quality database from the Section of Surgical Neuro-Oncology at the Department of Neurosurgery we have explored the impact of resection on survival in patients with brain metastases (Winther et al. 2023) and glioblastoma (Mendoza Miereles et al. 2023). Through these data we have also contributed to the framework paper on tissue sampling during tumor resection published in Lancet Oncology. We have also contributed to work on exploring the impact of pseudoprogression after radiotherapy (Blakstad et al., 2023).

Most important national and international collaborators

National

- Kyrre Emblem, OUE
- Else Marit Inderberg, OUE
- Petter Brandal, OUE
- Dag Josefson/Gunnar Kvalheim, OUE
- Jon A. Kyte, OUE
- Steven Wilson, UiO

International

- Krister Wennerberg, Copenhagen University, Denmark
- Aki Laakso, Emilia Gaal-Paavola, Töölö Hospital, Helsinki, Finland
- Krishna Bhat and Frederick Lang, MD Anderson Cancer Center, Houston, USA
- Winston Hide, Harvard University, MA, USA
- Philipp Euskirchen and David Capper, Charité Universitätsmedizin, Berlin, Germany





Funding

- Norwegian Cancer Society
- Barnekreftforeningen
- The Norwegian Research Council
- South-Eastern Regional Health Authorities
- OUH, Dept. of Neurosurgery

Scientific production of the research group in 2023

Peer reviewed original research articles:

Brynjulvsen M, Solli E, Walewska M, Zucknick M, Djirackor L, Langmoen IA, Mughal AA, Skaga E, Vik-Mo EO, Sandberg CJ.

["Functional and Molecular Heterogeneity in Glioma Stem Cells Derived from Multiregional Sampling."](#)

Cancers (Basel). 2023 Dec 13;15(24):5826

doi: 10.3390/cancers15245826.

Mendoza Mireles EE, Skaga E, Server A, Leske H, Brandal P, Helseth E, Rønning PA, Vik-Mo EO.

["The benefit of complete resection of contrast enhancing tumor in glioblastoma patients: A population-based study"](#)

Neurooncol Pract. 2023 Jul 3;10(6):555-564

doi: 10.1093/nop/npad037

Svensson SF, Halldórsson S, Latysheva A, Fuster-Garcia E, Hjørnevik T, Fraser-Green J, Birkeland Bugge RA, Grinband J, Holm S, Sinkus R, Vik-Mo EO, Emblem KE.

["MR elastography identifies regions of extracellular matrix reorganization associated with shorter survival in glioblastoma patients."](#)

Neurooncol Adv. 2023 Mar 5;5(1):vdad021

doi: 10.1093/noajnl/vdad021





Functional Neurosurgery Group



Group Leader

Ane Eidahl Konglund, MD/PhD, Dept. of Neurosurgery, OUH (akonglun@ous-hf.no)

Group Members

- Arild Egge, MD/PhD, OUH
- Frode Kolstad, MD/PhD, OUH
- Jugoslav Ivanovic, MD/PhD, OUH
- Mark Züchner, MD/PhD, OUH
- Awais Mughal, MD/PhD, OUH
- Eduardo Mendoza, MD, OUH
- Pål Gunnar Larsson, MD/Dr philos, OUH
- Marianne Nævra, Mphil, OUH
- Ketil Berg Olsen, MD, OUH
- Lars Etholm, MD/PhD, OUH

Research profile and aims

Main research aim is assessment of brain, medulla and peripheral nerve function and surgical treatment:

- Epilepsy surgery
- Deep brain stimulation
- Other electrical nerve tissue stimulation
- Assessment of brain function through EEG
- Stereotactic intracranial recording (SEEG)
- Function localization through intracranial recordings and stimulations
- Clinical assessment through machine learning
- Functional treatment of spinal trauma

Ongoing projects

- Cognitive function assessment through SEEG
- Consciousness assessment through EEG
- Dynamics of large-scale cortical networks during general anesthesia
- Changes in brain connectivity during the Wada test
- Epilepsy surgery outcome
- Adjuvant treatment with Cyclokapron in surgical treatment of CSDH
- Continuous spike wave during sleep (CSWS)
- NORSTIM – prospective study of DBS in STN in Parkinson disease
- TremorStim - DBS in tremor
- DBS in epilepsy
- Diagnostics and follow up of fatigue after cerebral abscesses with EEG
- Context-dependent memory maps in the medial temporal lobe





- Epileptic seizures: activity of single neurons as a diagnostic marker
- Recent trends in status epilepticus - with a special focus on outcome prediction and diagnosis
- Predictors of VNS stimulation
- New treatment in chronic subdural hematomas
- Refractory status epilepticus
- Laser ablation in Epilepsy
- Accuracy verification of a robotic system on a phantom
- Robot assisted methods in neurosurgery
- Resting state fMRI for epileptic focus localization
- Assessment of MEP suction in cerebral surgery
- 7 T MRI assessment in epilepsy surgery
- Motor Cortex Stimulation in patients with spinal cord injury
- Experimental models for spinal cord injury

Most important national and international collaborators

National

- Institute of Psychology, UiO
- Institute of Basic Medical Sciences, UiO
- Department of Neurology, OÜH
- Department of Anesthesiology, OÜH
- Children's Department, UUS, OÜH
- National Center for Epilepsy, OÜH
- Department of Radiology, OÜH
- Research laboratory, DNR, OÜH
- Internal Medicine, OÜH
- OsloMet
- Department of Engineering Cybernetics, NTNU

International

- Helene Wills institute, UC Berkeley, US
- Clinical Neurophysiology, Århus, Denmark
- Dianalund Epilepsy Center, Denmark
- Epilog
- Dept of Neuroscience, Helsinki University, Finland
- Human Brain Project (EBRAINS)
- The University of Auckland, New Zealand
- The University of Helsinki, Finland
- Sahlgrenska University Hospital, Gothenburg, Sweden

Funding

- Applications for national funding submitted in several projects
- National and international funding through collaborators

Scientific production of the research group in 2023

Invited lectures at international congresses: M Züchner, Nordic Neurotrauma Conference, Lund, Sweden

Peer reviewed original research articles: 12





Selected publications:

Llores A, Bellier L, Blenkmann AO, Ivanovic J, Larsson PG, Lin JJ, Endestad T, Solbakk AK, Knight RT.
“Decision and response monitoring during working memory are sequentially represented in the human insula”
iScience. 2023 Aug 17;26(10):107653. doi: 10.1016/j.isci.2023.107653. PMID: 37674986; PMCID: PMC10477069.

Riksaasen AS, Kaur S, Solberg TK, Austevoll I, Brox JI, Dolatowski FC, Hellum C, Kolstad F, Lonne G, Nygaard ØP, Ingebrigtsen T
“Impact of the number of previous lumbar operations on patient-reported outcomes after surgery for lumbar spinal stenosis or lumbar disc herniation”
Bone Joint J. 2023 Mar 15;105-B(4):422-430. doi: 10.1302/0301-620X.105B4.BJJ-2022-0704.R1. PMID: 36924173

Nordvik T, Server A, Espeland CN, Schumacher EM, Larsson PG, Pripp AH, Stiris T
“Combining MRI and Spectral EEG for Assessment of Neurocognitive Outcomes in Preterm Infants”
Neonatology. 2023;120(4):482-490. doi: 10.1159/000530648. Epub 2023 Jun 8. PMID: 37290419





Pediatric Neurosurgical Research Group



Group Leader

Radek Frič, MD PhD, Senior Consultant Neurosurgeon, Dept. of Neurosurgery, OUH
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Group Members

- Bernt J. Due-Tønnessen, MD/PhD, OUH
- Angelika Sorteberg, MD/PhD, UiO/OUH
- Jarle Sundseth, MD/PhD, OUH
- Arild Egge, MD/PhD, OUH
- Ulrikke Wiig, MD, OUH
- Jugoslav Ivanovic, MD/PhD, OUH
- Einar Vik-Mo, MD/PhD, UiO/OUH
- Pitt Niehusmann, MD/PhD, OUH
- Monica Cheng Munthe-Kaas, MD/PhD, OUH
- Einar Stensvold, MD/PhD, OUH
- Tale Torjussen, MD/PhD, OUH
- Aina Ulvmoen, MD/PhD, OUH
- Elin Tønne, MD/PhD, OUH
- Ketil Heimdal, MD/PhD, OUH
- Petra Aden, MD/PhD, OUH
- Anita Puhr, PhD, OUH
- Anne-Britt Skarbø, Consultant Neuropsych., OUH
- Eline Bryne, Med. student, UiO

Research profile and aims

The group's activities include several areas, primarily:

- Pediatric neurooncology - in cooperation with Depts. of Pediatrics and Oncology and Vilhelm Magnus Laboratory
- Cranofacial surgery - in collaboration with the Norwegian National Unit for Cranofacial Surgery
- CSF circulation incl. pediatric hydrocephalus, arachnoidal cysts and Chiari-malformation – in cooperation with Neurovascular & Cerebrospinal Fluid Research Group
- Functional pediatric neurosurgery incl. spasticity and epilepto surgery – in cooperation with Functional Neurosurgical Research Group
- Cerebrovascular neurosurgery incl. arteriovenous malformation, aneurysms, moyamoya disease
- Spinal dysraphism - in cooperation with pediatric neurology group at OUH





Ongoing projects

Selected and status per 2023

- AVM in children; intern quality register and long-term outcome study (R. Fric, B. Due-Tønnessen, B. Tennøe)
- continues
- Scandinavian multidisciplinary network on BESS (benign enlargement of subarachnoid spaces) and non-accidental head injuries (U. Wiig)
- continues
- Chiari 2 malformation in children with meningomyelocele (R. Fric, M Beyer, B Due Tønnessen)
-analyzed and submitted
- Pediatric aneurysms (S. Hatlevoll Myhre, R. Fric, A. Sorteberg, K. Nordengen)
-analyzed and under editing before submission
- Long-term outcome after surgical treatment of subependymal giant cell astrocytoma (M. Tuft, Y. Østby, P. Bache Marthinsen, B. Due-Tønnessen, R. Fric)
-analyzed and under editing before submission
- Surgical treatment of childhood-onset craniopharyngioma – long-term outcome study (R. Fric, U. Wiig, M. Wiedmann, J. Berg-Johnsen, B. Due-Tønnessen)
continues

PhD project

- Long-term follow-up of children treated for craniosynostosis with minimal invasive cranioplasty (Ulrikke Wiig)

Funding

South-Eastern Norway Regional Health Authority

Scientific production of the research group in 2023

Peer reviewed original research articles: 12

(Complete list: <https://www.ous-research.no/home/pn/Publications/24161>)

Selected publication:

Millgård M, Myhre A, Due-Tønnessen BJ, Billaud Feragen KJ.

"Parents' Perception of the Benefit of Receiving a Patient Information Leaflet Prior to Attending a Craniofacial Multidisciplinary Team Appointment"

Cleft Palate Craniofac J, 2023, Dec 13. DOI 10.1177/10556656231219579, PubMed 38092729





Frič R, König M, Due-Tønnessen BJ, Ramm-Pettersen J, Berg-Johnsen J.

"Long-term outcome of patients treated for craniopharyngioma: a single center experience"

Br J Neurosurg. 2023 Feb 17:1-9. doi: 10.1080/02688697.2023.2179600.

Frič R, Ringstad G, Eide PK.

"Low versus high intracranial compliance in adult patients with Chiari malformation Type 1 - comparison of long-term outcome after tailored treatment"

World Neurosurg. 2023 May:173:e699-e707. doi: 10.1016/j.wneu.2023.02.134.

(Editor's Choice article for the May 2023 issue of WORLD NEUROSURGERY)

Invited lectures at international congresses:

Due-Tønnessen BJ. Principles of scaphocephaly surgery. ESPN Course (12th Cycle, 2nd Year), May 29-June 2, Sundvolden, Norway.

Frič R. Intracranial pressure in Chiari type malformation 1. ESPN Course (12th Cycle, 2nd Year), May 29-June 2, Sundvolden, Norway.

Frič R. Specificities of Vascular Malformations in children. ESPN Course (12th Cycle, 2nd Year), May 29-June 2, Sundvolden, Norway.

Frič R. Principles of AVM surgery in children. Technical pitfalls. ESPN Course (12th Cycle, 2nd Year), May 29-June 2, Sundvolden, Norway.

Frič R. Long-term outcome after AVM-related bleeds in childhood. EANS Congress, Barcelona, September 23-28, 2023.

Wiig U. Syndromic synostosis, short-term and long-term complications. ESPN Course (12th Cycle, 2nd Year), May 29-June 2, Sundvolden, Norway.

Other lectures:

Frič R, Høydal Jensen B, Tennøe B, Due-Tønnessen BJ. Brain arteriovenous malformations in children – institutional experience from two decades of treatment. 28th Congress of ESPN, Rome, May 7-10, 2023.

Frič R, Høydal Jensen B, Tennøe B, Due-Tønnessen BJ. Lessons learned from the last two decades of multimodal treatment of treatment of brain arteriovenous malformations in children. EANS Congress, Barcelona, September 23-28, 2023.





Other selected assignments/activities:

ESPN course in Pediatric Neurosurgery, Sundvollen, June 2023 – B. Due-Tønnessen and R. Fric as co-chairs and organizers, as well as Invited Speakers/Faculty, together with U. Wiig, P. Aden, A. Ulvmoen

EANS congress, Barcelona, September 2023 – R. Fric elected Chair of the Section of Pediatric Neurosurgery, EANS for the period 2023-2025.

ERN (European Reference Network) crano 3D workgroup – meeting in Dublin 16-17.11.2023 (BJ Due-Tønnessen, U. Wiig).

SIOPe meeting, Berlin 7.-8.9.2023 (R. Fric, A. Ulvmoen, E. Stensvold)

Postgraduate course; Childhood craniopharyngeoma, Utrecht 09-10.03.23 (U. Wiig)





Department of Neurology

The Department of Neurology is located at Rikshospitalet and Ullevål, and treats patients with diseases of the brain, spinal cord and peripheral nerves, as well as certain muscle diseases.

The department has extensive clinical expertise and research activity, particularly related to movement disorders, epilepsy, stroke/diseases in the brain's blood supply, multiple sclerosis (MS), diseases that affect muscles such as myasthenia gravis and amyotrophic lateral sclerosis (ALS), hereditary neurological diseases, neuropsychiatry and painful conditions affecting the neck, back and peripheral nerves, as well as headache.

The Department of Neurology is headed by Professor Mathias Toft.





Movement disorders and neurodegeneration



Group Leader

Mathias Toft, MD/PhD, Professor and Head of Department, Dept. of Neurology,
UiO (mathias.toft@medisin.uio.no) and OUH (mtoft@ous-hf.no)

Group Members

- Espen Dietrichs, Prof MD PhD (PI Clinical movement disorders)
- Sara Staubo, MD
- Hedda Holm
- Silje Bjerknes, MD
- Inger Marie Skogseid, MD PhD (PI Deep brain stimulation and botulinumtoxin)
- Iselin Wedding, MD, PhD
- Nadja Anette Myrvik Kvernmo, MD
- Mathias Toft, Prof MD, PhD (PI Molecular studies of PD)
- Zafar Iqbal, PhD
- Solveig Dalbro, MD
- Natasha Demic, MD
- Lone Holmen, MSc
- Kaja Nordengen, MD, PhD (PI Translational neurodegeneration)
- Sofie Lysholm Lian, MD
- Grit Richter, MD
- Mina Adampour, MD
- Carl Johan Sogn, MD
- Elise Helene Stenstad
- Hildegunn Haugan
- Maja Brataas
- Helene Berge
- Angelina Maniaol, MD, PhD (PI Myasthenia and ALS)

Research profile and aims

The Movement disorders and neurodegeneration group brings together researchers studying a spectrum of chronic neurological disorders causing impaired motor function. Our areas of interest range across different movement disorders and neurodegenerative diseases.

In a majority of the conditions we study, the etiology is neurodegenerative, genetic or both.

Our scientific approaches span from translational studies, based largely on laboratory and bioinformatic methodologies, to observational studies and clinical trials recruiting patients from the Department of Neurology.

The group is a thematically overarching research group, organized into five subgroups focused on specific diseases and methodologies:





- [Clinical studies of movement disorders](#)
- [Molecular studies of Parkinson's disease](#)
- [Deep brain stimulation and botulinumtoxin treatment](#)
- Translational neurodegeneration
- [Myasthenia gravis and amyotrophic lateral sclerosis](#)

Ongoing projects

We perform clinical studies of patients with Parkinson's disease and studies on the efficacy of deep brain stimulation for Parkinson's disease, dystonia, and tremors.

Laboratory research is focusing on genetic, epigenetic and genomic studies. Furthermore, several projects are examining biomarkers in neurodegenerative diseases, with a focus on glial activation and clearance.

The last project group focuses on clinical studies of myasthenia gravis and amyotrophic lateral sclerosis, and participates in national and international projects related to epidemiology, genetics and clinical trials.

Most important national and international collaborators

National

- Multiple other groups within UiO and OUH
- The other university hospitals in Norway, incl. NeuroSysmed in Bergen
- Simula Research Center
- Norwegian Center of Stem Cell Research Ringen and Unicare Fram Rehabilitation Centres

International

- AI-MIND Consortium
- COURAGE-PD consortium
- Dr. Owen Ross, Mayo Clinic, USA
- Dr Wilma van der Berg, VuMC University Hospital, Amsterdam, Netherlands
- Prof. Per Odin, Lund University, Sweden

Funding

Among others:

- South-Eastern Norway Regional Health Authority
- The Norwegian Health Association

Scientific production of the research group in 2023

Peer reviewed original research articles: 17





Selected publications:

[Pleiotropy with sex-specific traits reveals genetic aspects of sex differences in Parkinson's disease.](#)

Nordengen K, Cappelletti C, Bahrami S, Frei O, Pihlstrøm L, Henriksen SP, Geut H, Rozemuller AJM, van de Berg WDJ, Andreassen OA, Toft M.

Brain. 2024 Mar 1;147(3):858-870. doi: 10.1093/brain/awad297. PMID: 37671566

[Dopamine agonist serum concentrations and impulse control disorders in Parkinson's disease.](#)

Staubo SC, Fuskevåg OM, Toft M, Lie IH, Alvik KMJ, Jostad P, Tingvoll SH, Lilleng H, Rosqvist K, Størset E, Odin P, Dietrichs E, Dietrichs ES.

Eur J Neurol. 2024 Feb;31(2):e16144. doi: 10.1111/ene.16144. Epub 2023 Nov 13. PMID: 37955562

[Transcriptomic profiling of Parkinson's disease brains reveals disease stage specific gene expression changes.](#)

Cappelletti C, Henriksen SP, Geut H, Rozemuller AJM, van de Berg WDJ, Pihlstrøm L, Toft M.

Acta Neuropathol. 2023 Aug;146(2):227-244. doi: 10.1007/s00401-023-02597-7. Epub 2023 Jun 22.

PMID: 37347276





Huntington's disease and neurodegenerative genomics



Group Leader

Lasse Pihlstrøm, MD/PhD, Senior Researcher and Consultant, Dept. of Neurology, OUE
(lasse.pihlstrom@medisin.uio.no)

Group members

- Lasse Pihlstrøm, MD, PhD
- Manuela Tan, PhD – postdoctoral fellow
- Khadeeja Siddique, PhD – postdoctoral fellow
- Maren Stolp Andersen, MD – PhD fellow
- Jon Anders Tunold, MD – PhD fellow
- Ingeborg Haugesag Lie, MD – PhD fellow
- Marleen van Walsem, PhD – psychologist and researcher
- Ellen Hoven Maartveten, research nurse
- Juni Kristensen Folge, medical student on the research programme

Research profile and aims

We study a range of neurodegenerative and movement disorders, combining clinical data collection with advanced genomics and biomarker research. An overarching aim of our work is to elucidate disease mechanisms and pave way for precision medicine in neurodegenerative disorders of both monogenic and complex etiology.

Genome-wide association studies (GWAS) have provided important knowledge about the genetic architecture of brain disorders and highlighted key molecular pathways. We aim to build on the insights from GWAS and advance our understanding further both by deep clinical phenotyping and advanced bioinformatic analyses of large genomic, epigenomic and transcriptomic datasets. In particular, we are interested in neuroinflammation, protein pathology and their intersection with genetic risk profiles.

Group leader Lasse Pihlstrøm is also heading the clinical team for Huntington's disease and is responsible for the follow-up of HD patients in the outpatient clinic at Department of Neurology. Our clinic is currently the only Norwegian site in the global Enroll-HD study. Huntington's disease is a monogenic disorder caused by a mutation in the *HTT* gene, yet the importance of genetic modifier variants elsewhere in the genome is increasingly recognized. We aim to contribute to a deeper understanding of these genetic modifiers, taking advantage of experience and methodologies from genomic studies of complex brain disorders, such as Parkinson's disease.

The ultimate aim of our research is to improve patient care. Observational studies such as PROSPOS and Enroll-HD are designed to facilitate clinical trials through their scientific output, but also by generating databases of well-characterized potential trial participants. Lasse Pihlstrøm is currently local PI of the NOPARK trial in Parkinson's disease. In 2023 he secured funding to conduct a similar trial in Huntington's disease. The NAD-HD study will be launched in 2024 and investigate the effect of nicotinamid riboside (vitamin B3) as a disease modifying treatment in Huntington's disease patients.





Ongoing projects

[Prospective study of parkinsonism in Oslo \(PROSPOS\)](#) is a longitudinal observational study tracking natural history, genetics, and biomarkers to understand disease mechanisms and facilitate personalized medicine in Parkinson's disease and atypical parkinsonism, including multiple system atrophy (MSA). This study forms the basis of a number of ongoing PhD projects involving methods, such as brain imaging using PET and MRI, studies of cerebrospinal fluid biomarkers, single-cell sequencing analyses and eye-tracking technology.

[Enroll-HD](#) is a global registry for Huntington's disease including both symptomatic and presymptomatic gene carriers, as well as family and community controls. Data is collected at annual visits. The study has included more than 20,000 participants worldwide.

[NOPARK](#) is a double-blind randomized controlled trial investigating nicotinamide riboside supplement as a potential disease-modifying treatment in Parkinson's disease. The trial is led from the Haukeland University Hospital and the NeuroSysMed center.

NAD-HD will be a double-blind randomized controlled multicenter trial investigating nicotinamide riboside supplement as a potential disease-modifying treatment in Huntington's disease, led by our group at OUS. Funding for the study was secured in 2023 and planned launch will be in 2024.

We collaborate extensively with local and international partners and are active members of several international consortia, in particular the [International Parkinson's Disease Genomics Consortium \(IPDGC\)](#), the [Global Parkinson's Genetics Program \(GP2\)](#) and the Genetic Modifiers of Huntington's Disease (GeM-HD) Consortium.

Most important national and international collaborators

National

- Close day-to-day collaboration with the Movement, muscle and neurodegeneration group
- Andreas Lossius, Institute of Basic Medical Sciences, UiO
- Haukeland University Hospital, Bergen with NeuroSysMed and Prof. Charalampos Tzoulis
- Marianne Fyhn and Torkel Hafting, Institute of Basic Medical Sciences, UiO
- Prof. Ole Andreassen, UiO, and the DemGene Consortium

International

- IPDGC (international Parkinson Disease Genetics Consortium)
- GP2 (Global Parkinson's Genetics Program)
- COURAGE-PD consortium
- Genetic Modifiers of Huntington's Disease (GeM-HD) Consortium
- Prof. Owen Ross, Mayo Clinic, USA
- Prof. Wilma van der Berg, Amsterdam University Medical Center, Netherlands
- Prof. Jon Mill, University of Exeter, UK
- Prof. Henry Houlden, University College London, UK





Funding

Among others:

- South-Eastern Regional Health Authority, Norway
- Michael J. Fox Foundation
- The Norwegian Health Association
- Norwegian Parkinson Research Fund
- University of Oslo
- The Dam Foundation
- The national KLINBEFORSK program for clinical therapy research in the specialist health services

Scientific production of the research group in 2023

Peer reviewed original research articles: 9

Selected publications:

Tunold JA, Tan MMX, Koga S, Geut H, Rozemuller AJM, Valentino R, Sekiya H, Martin NB, Heckman MG, Bras J, Guerreiro R, Dickson DW, Toft M, van de Berg WDJ, Ross OA, Pihlstrøm L (2023)
"Lysosomal polygenic risk is associated with the severity of neuropathology in Lewy body disease"
Brain, 146 (10), 4077-4087
DOI 10.1093/brain/awad183, PubMed 37247383

Tunold JA, Tan MMX, Toft M, Ross O, van de Berg WDJ, Pihlstrøm L (2023)
"Lysosomal Polygenic Burden Drives Cognitive Decline in Parkinson's Disease with Low Alzheimer Risk"
Mov Disord, 39 (3), 596-601
DOI 10.1002/mds.29698, PubMed 38124396

Andersen MS, Leikfoss IS, Brorson IS, Cappelletti C, Bettencourt C, Toft M, Pihlstrøm L (2023)
"Epigenome-wide association study of peripheral immune cell populations in Parkinson's disease"
NPJ Parkinsons Dis, 9 (1), 149
DOI 10.1038/s41531-023-00594-x, PubMed 37903812





Rare NeuroMuscular Disorders Research Group



Group Leader

Kristin Ørstavik, MD/PhD, Head of Section for Rare neuromuscular disorders and EMAN, Dept. of Neurology, OUH (krorstav@ous-hf.no)

Group members

- Kristin Ørstavik, MD PhD
- Trine Haug Popperud, MD PhD, PI Clinical studies in adults
- Sean Wallace, MD PhD, PI Clinical studies in children
- Marianne Nordstrøm, Registered dietitian, PhD, group leader ERN-NMD multidisciplinary group
- Hanne Ludt Fossmo, Physiotherapist, PhD-student, research coordinator
- Anna Benterud, MD, PhD-student
- Magnhild Rasmussen, MD PhD
- Anette Lie Granberg, physiotherapist and researcher

Associated members

- Ellen Annexstad, MD, PhD-student
- Gro Solbakken, Physiotherapist, PhD
- Jan Frich, MD PhD, Professor UiO
- Marleen Van Walsem, Neuropsychologist PhD





Research profile and aims

The Rare Neuromuscular Disorders Research Group was founded in 2019, bringing together researchers studying a spectrum of rare neuromuscular disorders causing impaired motor function.

Our areas of interest range across disorders affecting motor neurons (spinal muscular atrophy), muscular junction (myasthenic syndromes), muscle (primary myopathies and muscular dystrophies) and hereditary neuropathies. In a majority of the conditions we study, the etiology is genetic and progressive.

We do observational studies and clinical trials recruiting patients from the Department of Neurology and the National register of neuromuscular disorders. The research group is closely linked to the Section for rare neuromuscular disorders and EMAN at the Department of Neurology at OUH.

Ongoing projects

The group focuses on juvenile and adult neuromuscular disorders and the main objective is to contribute to early detection and diagnostics of disease, better treatment and multidisciplinary care for the people affected by the rare neuromuscular disorders and their relatives.

Spinal Muscular Atrophy (SMA) project

Since 2018 OUH has administered Nusinersin (Spinraza) to children with SMA. More recently, Zolgensma and Risdiplam has also been available treatments. We are involved in an ongoing Phd project on patients that have received treatment. PI and main supervisor is Sean Wallace.

We also have an ongoing project on the diet of children with SMA. PI is Marianne Nordstrøm.

Hypokalemic periodic paralysis project – In collaboration with Frambu

How are your muscles affected by what you eat and how physically active you are? In order to offer better guidance to people with hypokalemic periodic paralysis, we want to learn from the patients`experiences. In this research project, we therefore want to map the diet and physical activity level of people with hypokalemic periodic paralysis. The aim is to gain more knowledge about how diet and physical activity can affect the frequency, degree and duration of muscle weakness.

The project has already published a review-paper and finished the Interviews in 2023. A paper is now written on this subject. PI is Marianne Nordstrøm.

Myotonic Dystrophy type 1 projects

- We have finalized a Phd project on “Trunk Muscle Impairments and Pain in Myotonic Dystrophy type 1 Association to CTG size and Function”. Gro Solbakken did her dissertation in November 2021. Read a summary on the project here: [Public Defence: Gro Solbakken - UiO](#). Main supervisor was Kristin Ørstavik.
- We have an ongoing Phd project on “Symptoms, Outcome measures and Treatment of arm- and hand function in Myotonic Dystrophy type 1”. PhD student Hanne Ludt Fossmo. Kristin Ørstavik is a co-supervisor. The project consists of three substudies;
 - Translation, reliability and validity of the Norwegian version of ABILHAND-NMD and ACTIVLIM for people with Myotonic Dystrophy type 1. Paper submitted 2022





- Symptoms and Outcome Measures for Upper-Limb Function in Myotonic Dystrophy Type 1 (SOUL-DM1). [Symptoms and Outcome Measures for Upper-Limb Function in Myotonic Dystrophy Type 1](#).

Data collection ongoing in 2022. PI Kristin Ørstavik

- Technology Assisted Rehabilitation for Upper Limb Function in Myotonic Dystrophy Type 1 (Technorehab). [Technology Assisted Rehabilitation for Upper Limb Function in Myotonic Dystrophy Type 1](#). Data collection ongoing in 2022. PI Hilde Robinson

- We also collaborate in an ongoing PhD project from the Norwegian School of Sport Sciences. The project includes a study called Myotonic Dystrophy Type 1 and Resistance Exercise (STYRK DM1). [Myotonic Dystrophy Type 1 and Resistance Exercise](#). Kristin Ørstavik is a co-supervisor
- We have finished and have recently submitted a paper on DM1 in children and cognitive impairment (2022). PI is Magnhild Rasmussen

Duchennes muscular dystrophy project

We have an ongoing PhD project on Duchenne Muscular Dystrophy under 18y in Norway; [Duchenne Muscular Dystrophy < 18y in Norway: Genotype/Phenotype, Growth, Puberty, Bone Health and Quality of Life](#)

Third paper and thesis submitted in 2022. PhD student Ellen Annexstad and Main-supervisor Magnhild Rasmussen.

Charcot-Marie Tooth (CMT) project

Physical activity in people with hereditary polyneuropathies. Identify potential solutions that can be used in a future intervention study to improve quality of life and regular physical activity in people with CMT. In 2022, we have submitted several applications for funding and received 600 000 NKR from "Stiftelsen Sophies Minde". A qualitative study has been performed during 2023. PI and Main supervisor Kristin Ørstavik.

Neuromuscular disorders in Heart transplant recipients in Norway – the Heart-Musc Study

Several rare neuromuscular disorders may cause cardiomyopathy and, in some patients, even be fatal. Since 1983 almost 1100 people have received a heart-transplant (HTX) in Norway. Approximately 40% were diagnosed with cardiomyopathy. This is a collaboration between Department of Cardiology, Department of Medical Genetics and our Research Group. PI and main supervisor Kristin Ørstavik. The PhD project received funding from Nasjonalforeningen for Folkehelsen late autumn 2022. In this PhD study we are planning 3 work-packages:

- WP1. We will go through the medical records of all HTX, patients diseased or alive (after consent) and register if they had neuromuscular symptoms or findings, if there was a positive family history of cardiomyopathy/NMD and to what extent genetic testing was performed and the results.
- WP2. In alive patients with unknown genetic cause of cardiomyopathy, an updated genetic testing will be offered both to those previously tested and in those to date untested.
- WP3. In patients with genetic findings and/or medical records indicating an hereditary NMD, clinical testing as well as supplementary work-up will be performed.

In 2023 we have started on WP2, recruiting live HTX-patients, doing genetic testing and also have started testing neurologically relevant patients.





AMC project in collaboration with National Center for Rare Disorders (TRS), Sunnaas Hospital

In this project, we are recruiting all registered patients with AMC in Norway to explore both genetically and clinically if they have a rare NMD that might explain their arthrogryposis. This project is mainly localized at TRS, but Kristin Ørstavik is a co-supervisor in the planned PhD.

In 2023 several applications have been submitted the study have now received funding from HSØ.

Health Literacy in patients with rare Neuromuscular disorders and their relatives

A project involving several centers for rare disorders and with PI at Frambu.

In 2022 we received funding for a PhD student and a review paper was finalized and submitted in 2023.

PETRA-NMD – national RCT-study

This is a planned national study on the effect of personalized training in patients with adults with 3 different hereditary neuromuscular disorders-CMT, FSHD and DM1. It is a multicenter study, covering the whole country and with a multitude of outcome-measures as well as PROMS. This is a multidisciplinary study including basic scientists, neurologists and physiotherapists as well as sport physiologists and a psychologist. It was planned during the spring of 2023, and we received funding from KLINBEFORSK late 2023. More details will follow in future reports.

Most important national and international collaborators

National

- Dept of cardiology, OUH
- Prof S.O. Kolseth, Dept of Nutrition, Inst. of Basic Medical Sciences, UiO
- Multiple other groups within UiO and OUH
- The National Neuromuscular Center
- Frambu competence center
- TRS
- The other university hospitals in Norway
- Vestre Viken Hospital
- Neuromuscular Association Norway (FFM)

International

- ERN-NMD (European reference Network)
- Muskelsvindfonden ved Ulla Werluf and Charlotte Handberg, Århus, Denmark
- Bjarne Udd, Finland
- Nicole Voet, Klimmendaal and Radboudumc, Nijmegen, the Netherlands

Funding

Among others:

- National Advisory Unit on Rare Disorders (NKSD)
- Research fund of the Neuromuscular Association Norway (FFM)
- Sophie and Leif Torps fund to research on myotonic dystrophy (UNIFOR)
- Sophies Minde Foundation
- South-Eastern Norway Regional Health Authority
- The Norwegian Health Association
- KLINBEFORSK





Scientific production of the research group in 2023

Dissertation: 1

"Cognitive function behavior and quality of life in children with Myotonic Dystrophy type 1 in South - Eastern Norway"

Peer reviewed original research articles: 7

Selected publications:

"Cognitive function behavior and quality of life in children with Myotonic Dystrophy type 1 in South- Eastern Norway"

Aden P, Skarbø S, Wallace S, Ørstavik K, Rasmussen K

Eur J Paediatr Neurol 2023

10.1016 / j.ejpn.2023.05.004

"Translation, reliability and validity of the Norwegian version of the ABILHAND – NMD an the ACTIVLIM for Myotonic Dystrophy type 1"

Ludt Fossmo H, Ørstavik K, Frich J, Robinson H

Disabil rehabil. 2023

10.1080/09638288

"Polyneuropathy in adolescent childhood cancer survivors: the PACCS study"

Andries, Ørstavik K,, Nilsen KB

10.1016/j.pediatrneutrol. 2022.11.012





Cerebrovascular diseases



Group Leader

Mona Skjelland, Professor II and Consultant, Dept. of Neurology, OUH
(moskje@ous-hf.no) and UiO (m.e.skjelland@medisin.uio.no)

Group Members

- Karolina Skagen MD, PhD, senior researcher
- Lars Tveit MD, PhD-student
- Christian Lund, MD, PhD, senior researcher
- Therese Schjørlien, MD, PhD-student
- Kristine Stø, MD, PhD-student
- Mahtab Zamani, MD, PhD-student
- Brian Enriquez, MD PhD-student
- Maria Skytöti, MD PhD, senior researcher
- Vigdis Bjerkeli, Chief engineer, researcher
- Camilla Thorsen, study nurse
- Terje Nome, MD, PhD-student
- Markus Wiedmann, MD, PhD, senior researcher

Research profile and aims

The main goal is to conduct high-quality cerebrovascular research, including translational and clinical studies, leading to new knowledge and improved treatment of stroke patients.

Ongoing projects

- Advanced ultrasound methods in the assessment of carotid plaque instability
- The MIST study (Microbiota in Stroke); The Gut and Oral bacteria, Atherosclerosis and Ischemic Stroke Study
- Improving cerebral haemodynamic diagnostics using transcranial ultrasound in a neurocritical care cohort
- The BRIDGE study: Bridging pregnancy and fetal microchimerism with future female maternal cardiovascular and neurovascular health
- Inflammation in atherosclerosis and ischemic stroke; a biomarker study
- NORwegian prospective ultrasound study of CARotid RADiation-induced lesions in head and neck cancer patients (NOR-CARRAD)
- The StrokeOmics study: Multi-Omics for Precision Medicine in Acute Ischemic Stroke
- Cardiovascular risk in ketogenic diet, assessed by advanced ultrasound of carotid arteries
- Pre- and intracerebral vasculopathies in ischemic stroke, a register study

Investigator-led studies:

- Group members are participating in RCTs, observational and industry funded trials; ACST-2, STROKECLOSE, ESCAPE-NEXT, The OCCLUSION-AF Trial





Most important national and international collaborators

National

- Research Institute of Internal Medicine, OÜH, Prof. Bente Halvorsen
- Dept of Transplantation Medicine, OÜH, Prof. Johannes Hov
- Division of Obstetrics and Gynaecology, OÜH, Prof. Annetine Staff
- Dept of Immunology, Proteomics Core Facility UiO, Prof. Tuula Nyman
- Dept of Clinical and Molecular Medicine, NTNU, Prof. Terje Espevik

International

- Greater Manchester Comprehensive Stroke Center, UK, Prof. Craig Smith
- University of Maastricht, Netherlands, Prof. Erik Biessen
- University of Calgary, Canada, Prof. Michel Hill
- Clinical Research Faculty, University of Manchester, Prof. Ben Parker

Funding

- South-Eastern Norway Regional Health Authority
- The Research Council of Norway
- The Foundation Dam

Scientific production of the research group in 2023

Peer reviewed original research articles: 12

Selected publications:

Stø K, Skagen KR, Valeur J, Yang K, Bjerkeli V, Aukrust P, Skjelland M, Halvorsen B (2023). «*Increased plasma levels of non-sugar sweeteners in patients with symptomatic carotid atherosclerosis*» Scand Cardiovasc J, 57 (1), 2205068
DOI [10.1080/14017431.2023.2205068](https://doi.org/10.1080/14017431.2023.2205068), PubMed [37102258](#)

Enriquez BAB, Nome T, Nome CG, Tennøe B, Lund CG, Beyer MK, Skjelland M, Aamodt AH (2023). «*Predictors of outcome after endovascular treatment for tandem occlusions: a single center retrospective analysis*» BMC Neurol, 23 (1), 82 [10.1186/s12883-023-03127-4](https://doi.org/10.1186/s12883-023-03127-4), PubMed [36849925](#)

Krzywicka K, Aguiar de Sousa D, Cordonnier C, Bode FJ, Field TS, Michalski D, Pelz J, Skjelland M, Wiedmann M, Zimmermann J, Wittstock M, Zanotti B, Ciccone A, Bandettini di Poggio M, Borhani-Haghghi A, Chatterton S, Aujayeb A, Devroye A, Dizonno V, Geeraerts T, Giannmello F, Günther A, Ichaporia NR, Kleinig T, Kristoffersen ES et al. (2023) «*Decompressive surgery in cerebral venous sinus thrombosis due to vaccine-induced immune thrombotic thrombocytopenia*» Eur J Neurol, 30 (5), 1335-1345.
DOI [10.1111/ene.15735](https://doi.org/10.1111/ene.15735), PubMed [36773014](#)





Oslo Stroke Clinical Research Group



Group Leader

Else Charlotte Sandset, Consultant Neurologist, OUH
(else@sandset.net)

Senior Researcher, The Norwegian Air Ambulance Foundation and UiO

Group members

- Maren Ranhoff Hov, MD, PhD
- Rajiv Advani, MD, PhD
- Hege Ihle-Hansen, MD, PhD
- Guri Hagberg MD, PhD
- Kristian Lundsgaard Kraglund, MD, PhD
- Lasse Ormel, MD, PhD
- Helge Fagerheim Bugge MD, PhD-student
- Mona Guterud, paramedic, PhD-student
- Gisle Berg Helland, PhD-student
- Karianne Larsen, MD, PhD-student
- Georgios Vlachos, MD, PhD-student
- Helle Eilertsen, MD, PhD-student
- Lars Alteheld, MD

Affiliated members

- Håkon Ihle-Hansen (Vestre Viken)
- Jørgen Ibsen, (Vestre Viken)
- Dag Ferner Netteland (NK)
- Bjørn Jamtli (PRE)
- Camilla Hardeland (PRE)
- Espen Saxhaug Kristoffersen (AHUS)
- Karoline Skogen (KRN)
- Till Schellhorn (KRN)
- Silje Holt Jahr (AHUS)
- Ingrid Hustad (SNLA)

Study nurses/coordinators

- Maren Hauge
- Mia Dagsvik

Research profile and aims

The aim of the research group is to improve care in all points of the stroke treatment chains.
All projects should have direct implications for clinical practice.





Funding

- South-Eastern Norway Regional Health Authority
- The Research Council of Norway
- The Foundation Dam
- SNLA, Norwegian Air Ambulance Foundation

Scientific production of the research group in 2023

2023 was a productive year for our research group, with the highlight being the publication of the ParaNASPP study in the Lancet Neurology. In March, our group members contributed to the launch of NOU 2023: 5, «Den store forskjellen – om kvinners helse og betydningen av kjønn for helse»

Furthermore, we had a great event at Arendalsuka together with National Air Ambulance Foundation.

Peer reviewed original research articles: more than 30

Lectures at national and international conferences: more than 15

Selected publications:

Guterud M, Fagerheim Bugge H, Røislien J, Kramer-Johansen J, Toft M, Ihle-Hansen H, Bache KG, Larsen K, Braarud AC, Sandset EC, Ranhoff Hov M.

“Prehospital screening of acute stroke with the National Institutes of Health Stroke Scale (ParaNASPP): a stepped-wedge, cluster-randomised controlled trial”

Lancet Neurol. 2023 Sep;22(9):800-811. doi: 10.1016/S1474-4422(23)00237-5. PMID: 37596006.

Fischer U, Koga M, Strbian D, Branca M, Abend S, Trelle S, Paciaroni M, Thomalla G, Michel P, Nedeltchev K, Bonati LH, Ntaios G, Gatteringer T, Sandset EC, Kelly P, Lemmens R, Sylaja PN, Aguiar de Sousa D, Bornstein NM, Gdovinova Z, Yoshimoto T, Tiainen M, Thomas H, Krishnan M, Shim GC, Gumbinger C, Vehoff J, Zhang L, Matsuzono K, Kristoffersen E, Desfontaines P, Vanacker P, Alonso A, Yakushiji Y, Kulyk C, Hemelsoet D, Poli S, Paiva Nunes A, Caracciolo N, Slade P, Demeestere J, Salerno A, Kneihsl M, Kahles T, Giudici D, Tanaka K, Räty S, Hidalgo R, Werring DJ, Göldlin M, Arnold M, Ferrari C, Beyeler S, Fung C, Weder BJ, Tatlisumak T, Fenzl S, Rezny-Kasprzak B, Hakim A, Salanti G, Bassetti C, Gralla J, Seiffge DJ, Horvath T, Dawson J; ELAN Investigators

“Early versus Later Anticoagulation for Stroke with Atrial Fibrillation”

N Engl J Med. 2023 Jun 29;388(26):2411-2421. doi: 10.1056/NEJMoa2303048. Epub 2023 May 24. PMID: 37222476.

Hagberg G, Ihle-Hansen H, Abzhandadze T, Reinholdsson M, Hansen HI, Sunnerhagen KS.

“Prognostic value of acute National Institutes of Health Stroke Scale Items on disability: a registry study of first-ever stroke in the western part of Sweden”

BMJ Open. 2023 Dec 18;13(12):e080007. doi: 10.1136/bmjopen-2023-080007. PMID: 38110379; PMCID: PMC10748889.





Headache and Stroke



Group Leader

Anne Hege Aamodt, MD/PhD, FEAN, FESO

A/Prof, Senior Consultant and Researcher, Dept of Neurology, OUCH

and NorHEAD, NTNU (a.h.aamodt@medisin.uio.no / anhaam@oushf.no / anne.hege.aamodt@ntnu.no)

Group members

- Marion Boldingh, MD, PhD, postdoc
- Brian Enriquez, MD, PhD student
- Stephen Ryan, MD, PhD student
- Thor Skattør, MD, PhD student
- Gisle Berg Helland, PhD student
- Terje Nome, MD, Dr. Philos student
- Barbara Ratajczak-Tretel, MD, PhD
- Jesper Sømark, MD
- Anna Tancinova, MD, PhD student
- Burcu Bezgal, MD
- Maria Argren, MD, PhD student
- Peter M. Andel, MD, PhD student
- Linn Heitmann, MD, PhD student
- Jon André Totland, MD, PhD student
- Siv Pignatello, MD, PhD student
- Ansar Roy, research nurse
- Christina Kefaloykos, research nurse
- Helle Skalleberg, research nurse
- Kristine Jacobsen, research nurse
- Cecilia Adele Dunne, MD
- Marcus Boateng, medical student

Research profile and aims

The main goal is to conduct high-quality cerebrovascular and headache research, leading to new knowledge and improved treatment of stroke and headache patients. Since the start of the Covid pandemic we are also doing clinical trials in Covid.

The main research areas are:

- Reperfusion treatment in acute ischemic stroke
- Atrial fibrillation in cryptogenic stroke, the role of inflammation
- AI (Artificial intelligence) in stroke diagnostics
- Visual impairment in acute stroke
- Moyamoya angiopathy
- Headache treatment including migraine
- Neurological complications after covid infection and covid vaccines





Ongoing projects

- 2023 – 2029; Aarhus University Hospital; OCCLUSION-AF. Role: PI at OUH.
- 2024 – 2027; OUH; NorMig, placebo-controlled RCT testing dual therapy with CGRP monoclonal antibodies and onabotulinumtoxin. 400 patients. Role: Project leader.
- 2023; Cerebriu, Denmark – AQWUS – Automatic quantification of Wake-Up Stroke. Role: Partner, contribution with images and clinical data from OSCAR. Collaboration with CRAI, OUH.
- 2021 – 2026; OUH; AI-STROKE: Optimizing Acute Ischemic Stroke Diagnostics Using Artificial Intelligence Study. Norwegian multi-centre observational study. Role: Project leader.
- 2020 – 2023; University of Calgary, ESCAPE-NEXT, global RCT testing neuroprotection with nerinetide in acute ischemic stroke. 700 patients. Role: National coordinating investigator.
- 2020 – 2025; OUH; Ten CRAOS, RCT of tenecteplase in CRAO, 8 participating countries in Europe and Australia. Role: Project leader.
- 2020 – 2024; OUH – OPTMIG – RCT completed inclusion in 2024, 10 centers and 460 patients in Norway and Estonia – Role: PI at OUH.
- 2019 – 2024; University hospitals of Heidelberg and Hamburg; TENSION, RCT with endovascular therapy in acute ischemic stroke, 253 patients in Europe and Canada. Role: National coordinating investigator and PI at OUH.
- 2020 – 2026; OUH; the Norwegian study of Nervous System manifestations and sequelae in COVID-19 (NeuroCOVID). Role: Project leader.
- 2020 – 2024; University of Utrecht; PRECIOUS trial led from Utrecht: PREvention of complications to Improve OUTcome in elderly patients with acute Stroke. Role: National coordinating investigator and lead of health economy work package.
- 2019 – 2025; University of South-East Norway – the Norwegian Vision in Stroke (NorVIS). Role: Executive Board member.
- 2020 – 2024; OUH; StrokeVIS. Observational single-centre study of visual impairment after stroke. Role: Project leader.
- 2019 – 2024; St. Olavs Hospital; MiBlock, RCT, botulinum toxin towards the sphenopalatine ganglion in chronic migraine, Four centers in Norway, 170 patients. Role: Co-investigator.
- 2017 – 2024; OUH; NOR-FIB 2, The Norwegian Atrial Fibrillation and Stroke Study. Role: Project leader.
- 2016 – 2023; OUH; NOR-FIB 1, The Nordic Atrial Fibrillation and Stroke Study. Multi-centre observational study, 256 patients in Norway, Sweden and Denmark. Role: Project leader.
- 2015-; OUH; OSCAR Oslo Acute Reperfusion Stroke Study. 1200 EVT patients at OUH. Role: Project leader.

Most important national and international collaborators

National

- Dept of Cardiology, OUH, Prof. Dan Atar
- Research Institute of Internal Medicine, OUH, Prof. Bente Halvorsen
- Dept of Ophthalmology, OUH, Prof. Morten Carstens Moe
- Dept of Neurology, St. Olavs Hospital/Dept of Neuromedicine and Movement Science, NTNU
- Dept of Neurology, Haukeland University

International

- University of Calgary, Canada, Prof. Mayank Goyal, Michael Hill
- University of Copenhagen, Denmark, A/Prof. Thomas C. Truelsen
- Aarhus University Hospital, Denmark, Prof. Claus Z. Simonsen
- Helsinki University Hospital, Finland, A/Prof. Petra Ijäs
- Karolinska University Hospital, Sweden, A/Prof. Michael Mazya





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| <ul style="list-style-type: none">- Hospital, Prof. Øivind Torkildsen, Marte Bjørk- Dept of Behavioural Medicine, Institute of Basic Medical Sciences, UiO, and Psychosomatic and C-L psychiatry, adult, Div. of Mental Health and Addiction, OUH, Prof. Birgitte Boye- Dept of Radiology and Nuclear Medicine, Prof. Mona Beyer, Computational Radiology and Artificial Intelligence, Prof. Atle Bjørnerud- Dept of Clinical Medicine, The Arctic University of Norway, A/Prof. Agnethe Eltoft | <ul style="list-style-type: none">- St. Vincent's Hospital Melbourne, Australia, A/Prof. Lauren Sanders- National Hospital for Neurology and Neurosurgery, University College London Hospital, UK, Prof. Manjit Matharu- Besta Neurological Institute, Milan, Italy, Prof. Anna Bersano- Universitätsklinikum Hamburg-Eppendorf, Germany, Prof. Götz Thomalla |
|--|--|

Funding

- Klinbeforsk
- South-Eastern Norway Regional Health Authority
- The Research Council of Norway
- The Foundation Dam
- Odd Fellow
- EU grants

Scientific production of the research group in 2023

PhD dissertation: Barbara Ratajczak-Tretel: Uncovering underlying aetiologies in cryptogenic stroke: The Nordic Atrial Fibrillation and Stroke Study. Dissertation 24.11.23

Peer reviewed original research articles: 15

Selected publications:

De Jonge JC, Sluis WM, Reinink H, Bath PM, Woodhouse LJ, Zweedijk B, van de Beek D, Aamodt ..., Thomalla G, van der Worp HB; PRECIOUS investigators

"Prevention of infections and fever to improve outcome in older patients with acute stroke (PRECIOUS): a randomised, open, phase III, multifactorial, clinical trial with blinded outcome assessment"

Lancet Reg Health Eur. 2023 Dec 1;36:100782. doi: 10.1016/j.lanepe.2023.100782. PMID: 38074444; PMCID: PMC10698669. IF 20.9





Bendszus M, Fiehler J, Subtil F, Bonekamp S, Aamodt AH.. Fuentes B, Gizewski ER, Hill MD, Krajina A, Pierot L, Simonsen CZ, Zeleňák K, Blauenfeldt RA, Cheng B, Denis A, Deutschmann H, Dorn F, Flottmann F, Gellißen S, Gerber JC, Goyal M, Haring J, Herweh C, Hopf-Jensen S, Hua VT, Jensen M, Kastrup A, Keil CF, Klepanec A, Kurča E, Mikkelsen R, Möhlenbruch M, Müller-Hülsbeck S, Münnich N, Pagano P, Papanagiotou P, Petzold GC, Pham M, Puetz V, Raupach J, Reimann G, Ringleb PA, Schell M, Schlemm E, Schönenberger S, Tennøe B, Ulfert C, Vališ K, Vítková E, Vollherbst DF, Wick W, Thomalla G; TENSION Investigators

"Endovascular thrombectomy for acute ischaemic stroke with established large infarct: multicentre, open-label, randomised trial"

Lancet. 2023 Nov 11;402(10414):1753-1763. doi: 10.1016/S0140-6736(23)02032-9. Epub 2023 Oct 11. PMID: 37837989. IF 168.9

Tancin Lambert A, Ratajczak-Tretel B, Al-Ani R, Arntzen K, Bakkejord GK, Bekkeseth HMO, Bjerkeli V, Eldøen G, Gulsvik AK8, Halvorsen BE, Høie GA, Ihle-Hansen H, Ihle-Hansen H, Ingebrigtsen S, Johansen H, Kremer C, Krogseth SB, Kruuse C, Kurz M, Nakstad I, Novotny V, Næss H, Qazi R, Rezaj MK, Rørholt DM, Steffensen LH, Sømark J, Tobro H, Truelsen TC, Wassvik L, Ægidius KL, Pesonen M, de Melis M, Atar DA, Aamodt AH

"Biomarkers Predictive of Atrial Fibrillation in Patients with Cryptogenic Stroke. Insights from The Nordic Atrial Fibrillation and Stroke (NOR-FIB) Study"

Eur J Neurol 2023; May;30(5):1352-1363. doi: 10.1111/ene.15746. Epub 2023 Mar 10. PMID: 36786305. Article ID: ENE15746 Article DOI: 10.1111/ene.15746. Internal Article ID: 17651785. IF 6.089





ERGO - Epilepsy Research Group of Oslo



Team Leader for ERGO and Group Leader for Clinical Epilepsy Research

Erik Taubøll, Professor, Dept. of Neurology, OUH and UiO

(erik.tauboll@medisin.uio.no) /OUH (erik.tauboll@ous-hf.no)



Group Leader for Translational Epilepsy Research

Kjell Heuser, Senior Consultant, Dept. of Neurology, OUH

(kheuser@ous-hf.no)

Group Members

- Erik Taubøll, Senior Consultant, Professor. **Team leader ERGO and Group leader for Clinical Epilepsy Research**
- Kjell Heuser, Senior Consultant, **Group leader**; translational epilepsy research
- Dag Aurlien, Consultant, Stavanger. **Project Leader**; epilepsy and cardiology
- Monika Mochol, MD, PhD, postdoc (combined with NCMM)
- Sigrid Svalheim, Senior consultant
- Toni Berger, MD, PhD, specialty registrar, postdoc
- Alba Gonzalez; MD, PhD fellow; Epilepsy and cardiology
- Helle Hermann, MD, PhD fellow; deep brain stimulation for epilepsy
- Line Sveberg, Consultant; Women and epilepsy/autoimmune epilepsy
- Ketil Berg Olsen, MD, Senior Consultant; Status epilepticus
- Line Bedos Ulvin, MD, PhD fellow; Status epilepticus
- Hild F. Sødal, MD, PhD fellow; post-traumatic epilepsy project
- Agnes Balint Bjørke, MD, PhD fellow, TLE project
- Ylva Østby, Neuropsychologist, TLE project
- Maren Ranhoff Hov, MD, PhD, MD PhD, Dep Neurology and Norwegian Air Ambulance Foundation
- Ingrid Hustad, MD, PhD fellow, Norwegian Air Ambulance Foundation

Associate Group Members

- Cecilie Nome, PhD candidate, TLE/translation, Letten Research Center
- Rune Enger, Head of Letten Research Center, Institute of Basic Medical Science, UiO
- Bjørnar Hassel, Department of Neurorehabilitation, UiO/OUH
- Leif Gjerstad, MD/PhD Prof. emeritus, OUH/UiO
- Pål Gunnar Larsson, Department of Neurosurgery, OUH





Research profile and aims

ERGO has been active in epilepsy research for about 25 years and consists of two groups:

- Research group for Clinical Epilepsy Research. Group leader Erik Taubøll
- Research Group for Translational Epilepsy Research. Group leader Kjell Heuser

The many research projects are closely linked and are therefore referred to collectively.

Research within ERGO is currently focusing on six main areas:

1) Epilepsy-Translational Research. This focuses on research on epileptogenesis, glial cells and genetic and clinical studies. Group leader is Kjell Heuser. The initial studies are basic research, using several *in vivo* epilepsy models. In addition, larger patient trials are used, in which the clinical, radiological (MRI), and neuropsychological development of TLE is monitored over time.

We have also performed epigenetic studies investigating changes in DNA methylation and gene expression during epileptogenesis.

2) Gender issues, endocrinology and long-term effects of ASMs. The project leader is Sigrid Svalheim. "Gender issues" have been an important area of research for the group over many years, with many PhD theses. The current major focus is studying the long-term side-effects of ASMs on hormones, immunology, haematology and bone health. The effects of epilepsy and antiepileptic drugs on inflammation parameters have now been studied both clinically and using a zebra-fish model.

3) Epilepsy and cardiology / SUDEP (sudden unexpected death in epilepsy patients). The project leader is Dag Aurlien, who is presently based at Stavanger University Hospital. The project is a collaborative venture between Oslo University Hospital (OUS) and Stavanger University Hospital. Both clinical and basic animal studies are now close to an end.

4) Status epilepticus (SE). OUh has a large population of patients who has experienced SE and epidemiological studies have recently been performed regarding underlying causes, treatment, outcome etc. We will now together with colleagues from Denmark (Odense university, prof CP Beier) especially focus on possible predictors for outcome and study in more detail treatment of the super refractory cases.

5) Traumatic brain injury and posttraumatic epilepsy. Studies to investigate possible predictors for posttraumatic epilepsy have recently been started, in collaboration with colleagues in Italy and USA. Primarily, factors of relevance to inflammation will be the focus of our studies.

6) The Prehospital Seizure Control trial – (PreCtrl). Mapping of prehospital seizure management in the ambulance service of Oslo, Norway. In collaboration with Dep. of Prehospital services, Oslo University Hospital and The Norwegian Air Ambulance Foundation. This project will start up during spring 2023. Project leader is Maren Ranhoff Hov and PhD student is Ingrid Hustad.

In addition to these five main areas of research, the group also has interests in deep brain stimulation (DBS) in epilepsy and ketogenic diets.





Ongoing projects

- **Can the brain's glial cells be a point of attack for novel ASM treatments?**

This is a major project in which, among other approaches, a mouse model is being used to investigate how epilepsy arises and evolves over time. The main question is how glia cells behave during the development and worsening of epilepsy, and whether these changes can be affected by various drugs such as ASMs, anti-inflammatory drugs, drugs that affect intracellular cell signalling etc.

Studying possible mechanisms involved in epileptogenesis may open new treatment strategies to prevent epilepsy, i.e. after stroke and brain injuries.

One PhD degree; A translational view on epileptogenesis, was completed within the field in 2022; Toni Berger.

- **Is epilepsy a progressive disease?**

This long-term study focuses on changes in the clinical, radiological and neuropsychological picture in patients with temporal lobe epilepsy (Pro-TLE). Comprehensive investigations are conducted on patients with newly diagnosed temporal lobe epilepsy at various time points over a 10-year period. Two papers were recently published: Bjørke AB et al, Epilepsy & Behav 2021 and Bjørke AB et al, Front Neurol 2022.

- **Long-term effects of ASMs**

Patients starting treatment with the ASMs levetiracetam and lamotrigine will be followed prospectively for 2-years in terms of immunological, hormonal, and haematological adverse reactions, and possible changes in bone health. The data will be collected through interviews, questionnaires, blood tests, and bone density measurements. This project is supported with a 50 % PhD student from Østfold Hospital Trust.

As part of this project, studies on the effect of ASMs on gene expression related to immune genes in zebra-fish have also recently been finished in collaboration with NMBU (Norwegian University of Life Sciences) (Mochol M et al Epilepsy Res 2021), and a study on the effect of ASMs on markers for inflammation in humans with epilepsy is performed together with collaborators in OUH (See Mochol M et al, Acta Neurol Scand 2023).

- **Epilepsy and cardiology**

It has become increasingly clear that several epilepsies are channelopathies, as are many cardiac arrhythmias, and are associated with many of the same channels and ions. The relationship between epilepsy and cardiac arrhythmias like the long QT syndrome (LQTS) is studied. This is also of central importance for understanding sudden unexpected death in epilepsy (SUDEP). We have also studied the impact of several years of active epilepsy on cardiac function. Studies will be finished in 2023. (see i.e. González A, et al, Epilepsy Res 2020; González et al, Case Rep Neurol 2022).

- **National registration of refractory status epilepticus**

We are collating national experiences on how patients with this condition are treated in Norway and how this can be improved. As there are only a few such patients at each centre, joint exchange of experiences is essential. Collection of data commenced in 2015. A national reference group for SE has been established.





Recently, an international collaboration with prof. Christoph Patrick Beier and his group in Odense, Denmark has been started focusing on prognosis of status epilepticus.

(see also: Ulvin LB et al, 2018/2019, Habhab SF et al, Epilepsy Behav 2020; Roberg L et al, JAMA Neurology 2022, Heuser K et al, Exon Publ 2022).

ERGO is from 2024 also including status epilepticus patients into a European network supported by EAN (European Academy of Neurology).

- **Deep brain stimulation (DBS) in epilepsy**

In this study, patients with hard-to-treat epilepsy are treated with DBS using a blinded study design. The clinical work is now completed and results published. A PhD thesis has been submitted for evaluation.

- **Traumatic brain injury and posttraumatic epilepsy**

A PhD project to study the possible predictive value of different parameters, especially related to inflammation, measured immediately after traumatic brain injuries on the frequency of posttraumatic epilepsy was started in 2021. This is an international collaborative work with groups from US and Europe and with financial support from the US Department of Defence.

- **The Prehospital Seizure Control trial – (PreCtrl)**

ERGO is one of several collaborators in this study that will start in 2023. The intention is to describe the prehospital and initial inhospital pathways and treatment of patients with seizures, to standardize national EMS guidelines and improve time to control in seizure management for better prognosis for the patients. We also plan to implement a new model for standardizing competence, communication and treatment for prehospital seizure assessment – the PreCTRL model.

The other collaborators are: The Norwegian Air Ambulance Foundation, Faculty of Health Science, Oslo Metropolitan University, and Department of Prehospital services, OUH.

Most important national and international collaborators

National

- Dept. of Cardiology, OUH, Prof Kristina Hermann Haugaa
- Kaja Selmer's research group, Div. of Clinical Neuroscience, OUH
- National Centre for Epilepsy
- Stavanger University Hospital
- Østfold Hospital Trust
- Institute of Basic Medical Science, Glia cells research group, UiO, Rune Enger
- Dr Olav B Smedland and coworkers
- NORMENT, OUH
- Maren Ranhoff Hov, Norwegian Air Ambulance Foundation

International

- Institute of Cellular Neurosciences, Medical Faculty, University of Bonn, Germany (Prof. C. Steinhäuser)
- Pavel Klein, the CURE programme for post-traumatic epilepsy research, Washington, USA
- Annamaria Vezzani, Department of Neuroscience, IRCCS – Mario Negi Institute for Pharmacological Research, Milan, Italy
- Prof Christoph Patrick Beier, Odense University Hospital, University of Southern Denmark, Denmark





Scientific production of the research group in 2023

Ph.D. dissertation: 1. Monika Mochol. Interactions between epilepsy, antiseizure medication and the immune system. UiO, 2023

Peer-reviewed original research articles: 6

Abstracts, national/international: 1

International reviews: 2

National publications: 3

Speaker at international congresses: 4

Kjell Heuser. Astrocyte-driven epileptogenesis and its role in development of refractory SE. 2nd Nordic Status Epilepticus Meeting, June 2023

Toni Berger: DNA methylation as a preventive treatment target of epileptogenesis. 2nd Nordic Status Epilepticus Meeting, June 2023

Erik Taubøll. Epileptogenesis – definitions and basic principles. 2nd Nordic Status Epilepticus Meeting, June 2023

Erik Taubøll. The legacy of Jouko Isojärvi as a pioneer for research on hormonal aspects of epilepsy. Finnish Epilepsy Society Meeting, Finland, May 2023

Speaker at national congresses: 3

Erik Taubøll. Antiepileptika – noen kliniske betrakninger. Meeting in regional Legemiddelforum HSØ, Oslo March 2023

Erik Taubøll: Fra klinikk til praksis. Rykninger i intesivavdelingen. Nevrodagene 2023; state of the art lecture. March 2023

Organising congresses and meetings: ERGO organized the 2nd Nordic Status Epilepticus Meeting, Bergen, June 2023. In collaboration with national and Nordic colleagues.

Selected publications

“Time To Control-A goal in seizure management”

Horn MA, Hov MR, Heuser K, Taubøll E.

Seizure. 2023 Mar;106:76. doi: 10.1016/j.seizure.2023.02.008.

Karadag N, Shadrin AA, O'Connell K, Hindley GFL, Rahman Z, Parker N, Bahrami S, Fominykh V, Cheng W, Holen B, Alvestad S, Taubøll E, Steen NE, Djurovic S, Dale AM, Frei O, Andreassen OA, Smeland OB.

“Identification of novel genomic risk loci shared between common epilepsies and psychiatric disorders”

Brain. 2023;146(8):3392-3403. doi: 10.1093/brain/awad038.





Mochol M, Taubøll E, Aukrust P, Ueland T, Andreassen OA, Svalheim S.

*"Serum Markers of Neuronal Damage and Astrocyte Activity in Patients with Chronic Epilepsy:
Elevated Levels of Glial Fibrillary Acidic Protein"*

Acta Neurol Scand 2023, Volume 2023, Article ID 7246373, 5 pages,

<https://doi.org/10.1155/2023/7246373>.

Funding

- UiO – NCMM, 1 postdoc (50%)
- Internal, OUH, 2 PhD (1 clin stip, 1 D-position)
- Østfold Hospital Trust, 0,5 PhD
- Norwegian Air Ambulance Foundation, 1 PhD (collaboration ; NAAF and ERGO)





Multiple Sclerosis (MS) – Clinical and epidemiological MS-studies



Group Leader

Elisabeth Gulowsen Celius, Professor and Consultant of Neurology (MD/PhD),
Department of Neurology, OUH and Institute of Clinical Medicine, UiO
(e.g.celius@medisin.uio.no/ uxelgu@ous-hf.no)

Group members

- Elisabeth Gulowsen Celius, MD/PhD, Professor, Dept of Neurology, OUH/UiO
- Pål Berg-Hansen, MD/PhD, Consultant, Dept of Neurology, OUH
- Cecilia Smith Simonsen, MD/PhD, Dept of Neurology, Drammen Hospital
- Heidi Øyen Flemmen, MD/PhD fellow, Consultant, Skien Hospital/OUH
- Line Broch, MD, PhD fellow, Consultant, Drammen Hospital/OUH
- Binyam Bungudo, PhD, Postdoc, UiO
- Kamilla Brekke, MD, PhD fellow, Sykehuset Vestfold / UiO
- Harald Myklebust, MD, PhD fellow, Drammen hospital/UiO
- Anne Høgset, MD, Dept of Neurology, OUH/UiO
- Marte Wendel-Haga, MD/PhD, Consultant Kysthospitalet and Dept of Neurology, OUH

Associated Group Members

- Piotr Sowa, MD/PhD, Consultant, Division of Radiology and Nuclear Medicine, OUH

We are working closely together with all the members of the other MS subgroups.

This year we have had one student connected to our subgroup, writing student thesis:

- Anniken K. Jørgensen, medical student (Celius)

Research profile and aims

Multiple Sclerosis (MS) research group at the Department of Neurology, OUH and UiO, aims to identify characteristics and susceptibility factors of MS, and to contribute to a better understanding of the disease and development of better treatments. We perform genetic, immunological, clinical, epidemiological, environmental, MRI and translational studies of MS in collaboration with national and international research partners and networks.

Ongoing projects

- The BOTV-project. Epidemiology in Buskerud, Oslo, Telemark and Vestfold.
- Heidi Øyen Flemmen, PhD: Socioeconomic factors as predictors for disease susceptibility and disease progression in Multiple sclerosis, Supervisor: Elisabeth Gulowsen Celius, Co supervisor: Pål Berg-Hansen





- Line Broch, PhD: Fatigue in Multiple Sclerosis. Supervisor: Elisabeth Gulowsen Celius, Co-supervisor: Heidi Ormstad
- Kamilla Brekke, PhD: Multiple sclerosis and aging – a real world, population-based cohort study. Supervisor: Cecilia Smith Simonsen, Elisabeth G. Celius, Brit A Blaauw
- Harald Myklebust, PhD: Multiple sclerosis and cognition. Supervisor: Cecilia Smith Simonsen, Elisabeth G. Celius
- Anne Høgset: Socioeconomic factors in MS. Supervisor: Elisabeth G. Celius, Cecilia Smith Simonsen
- Hanne F. Harbo, Steffan D. Bos, Pål Berg-Hansen, Tone Berge, Elisabeth G Celius, Mona Beyer, Einar A. Høgestøl, Synne Brune, Goran Petrovski, Dragana Drobniak Nes, Sigrid Aune de Rodez Benavent: MultipleMS - partner in EU Horizon 2020-project (Harbo Oslo PI)
- Einar A. Høgestøl, Hanne F. Harbo, Dan Rinker, Elisabeth Celius, Piotr Sowa, Mona K Beyer: MAGNIMS collaboration on various MRI projects
- Elisabeth G. Celius, Pål Berg-Hansen, Stine Marit Moen/MS Centre Hakadal and SINTEF: AutoActive: Tools and Methods for Autonomous Analysis of Human Activities from Wearable Device Sensor Data (SINTEF PI)
- Elisabeth G. Celius: Lemtrada PASS, international observational study (Sanofi). EGC national investigator
- Elisabeth G. Celius: CLAD Cross, an international study on switch to cladribine (Merck). EGC member of steering group and national investigator.
- Elisabeth G. Celius, Pål Berg-Hansen, Åshild Skardhamar, Lars Skattebøl, Elisabeth Gjfsen and Synne Brune: HERCULES – an international trial of tolebrutinib (Sanofi). EGC PI.
- Elisabeth G. Celius, Stine Marit Moen/MS Centre Hakadal, Tone Berge and OsloMet: Use of functional near-infrared spectroscopy analyses for studies of neuroplasticity in MS patients – a pilot study
- Elisabeth G. Celius, Paul Lillrank, Aalto University and Ragnhild Halvorsrud, SINTEF: PATHWAY: A toolkit for managing and communicating patient pathways
- Gro O. Nygaard, Hanne F Harbo and Oslo MS Research Group: NOR-MS. Norwegian multicenter study of cladribine and rituximab (NOR-MS)
- Gro O. Nygaard, Marton König, Elisabeth Gulowsen Celius, Hanne F Harbo, Ingeborg Aaberge (FHI), Audun Aase (FHI), Åslaug R Lorentzen (SSHF), Lars L Skattebøl: Vaccine responses in MS patients
- GLIMPSE: A comparative study of cladribine with other high-efficacy treatments using real-world data. Stig Wergeland, Elisabeth G. Celius, Jan Hillert, Melinda Magyari, Tim Spelman





Most important national and international collaborators

National

- Mona Beyer, Rigmor Lundby, Piotr Sowa, Atle Bjørnerud and Tuva Hope, Div. of Radiology and Nuclear Med., OUH
- Øivind Torkildsen, Stig Wergeland and Jan Aarseth, Haukeland University Hospital
- Peyman Mirtaheri, Dept of Mechanical, Electronics and Chemical Engineering, OsloMet
- Heidi Ormstad, Universitet Sør-Øst/OsloMet
- Kristina Gervin and Kaja Selmer, FoU dept, Div of Clinical Neuroscience, OUH
- Frederic Meyer and Trine Seeberg, SINTEF
- Ragnhild Halvorsrud, SINTEF

International

- Ingrid Kockum, on behalf of the MultipleMS consortium
- Mara Rocca and Rosa Cortese, on behalf of the MAGNIMS consortium
- An Goris, on behalf of the International MS Genetics Consortium
- Stephen Sawcer, University of Cambridge, UK
- Sergio E. Baranzini, University of California, San Francisco, US
- Nordic MS genetics consortium (Hillert, Olsson, Kockum, Oturai, Sørensen, Saareala)
- Tobias Granberg, Fredrick Piehl, Karolinska Institute, Stockholm, Sweden
- Paul Lillrank, Aalto University, Finland

Funding

- The Research Council of Norway
- University of Oslo
- South-Eastern Norway Regional Health Authority grant
- Vestre Viken Hospital
- Telemark Hospital
- Odd Fellow Foundation
- Oslo MS foundation
- National MS Society of Norway

Scientific production of the research group in 2023

Peer reviewed original research articles: 9

PhD thesis:

Heidi Øyen Flemmen: "Socioeconomic factors in multiple sclerosis"
Supervisor: Elisabeth Gulowsen Celius





Selected publications:

"No association between disease modifying treatment and fatigue in multiple sclerosis"

Broch L, Flemmen HØ, Simonsen CS, Berg-Hansen P, Ormstad H, Brunborg C, Celius EG.

Mult Scler Relat Disord. 2023 Nov;79:104993. doi: 10.1016/j.msard.2023.104993. Epub 2023 Sep 6.

"Locus for severity implicates CNS resilience in progression of multiple sclerosis"

International Multiple Sclerosis Genetics Consortium; MultipleMS Consortium

Nature. 2023 Jul;619(7969):323-331. doi: 10.1038/s41586-023-06250-x. Epub 2023 Jun 28.

"Humoral immunity to SARS-CoV-2 mRNA vaccination in multiple sclerosis: the relevance of time since last rituximab infusion and first experience from sporadic revaccinations"

König M, Lorentzen ÅR, Torgauten HM, Tran TT, Schikora-Rustad S, Vaage EB, Mygland Å, Wergeland S, Aarseth J, Aaberge IAS, Torkildsen Ø, Holmøy T, Berge T, Myhr KM, Harbo HF, Andersen JT, Munthe LA, Søraas A, Celius EG, Vaage JT, Lund-Johansen F, Nygaard GO.

J Neurol Neurosurg Psychiatry. 2023 Jan;94(1):19-22. doi: 10.1136/jnnp-2021-327612. Epub 2021 Oct 20.

Invited lectures at international congresses:

Several national and international meetings and conferences

Social Media; Facebook: «Multippel Sklerose Forskningsgruppen Oslo»





Multiple sclerosis (MS) - Therapeutic trials and vaccine studies



Group Leader

Gro Owren Nygaard, Researcher and Consultant of Neurology (MD/PhD),
Department of Neurology, OUH and UiO (g.o.nygaard@medisin.uio.no /
uxgryg@ous-hf.no)

Group members

- Einar August Høgestøl, MD/PhD, Researcher and Resident, Dept of Neurology, OUH, Associate Professor Dept of Psychology, UiO
- Lars L. Skattebøl, MD/PhD fellow, Resident, Dept of Neurology, OUH, UiO
- Mathias H. Øverås, MD/PhD fellow, Resident, Dept of Neurology, OUH, UiO
- Synne Johannesen, Study nurse, Dept of Neurology, OUH
- Marton König, MD/PhD, Postdoc and Consultant, OUH
- Tilde Harrisleff Rasmussen, MD/PhD fellow, Dept of Neurology, OUH, UiO
- Piotr Sowa, MD/PhD, Consultant, Division of Radiology and Nuclear Medicine, OUH
- Rigmor Lundby, MD/PhD, Consultant, Division of Radiology and Nuclear Medicine, OUH
- Marte Wendel-Haga, MD/PhD, Consultant Kysthospitalet and Dept of Neurology, OUH

Associated Group Members*

- Mona K Beyer, MD/PhD, Professor, Division of Radiology and Nuclear Medicine UiO/OUH
- Elisabeth Gulowsen Celius, MD/PhD, Professor, Dept of Neurology, OUH/UiO
- Hanne Flinstad Harbo, MD/PhD/MHA, Professor and Head of Dept of Neurology, OUH/UiO
- Tone Berge, MSc/PhD, Head of Section – Neuroscience Research Uni, FOU dept, OUH, Professor, OsloMet
- Nils Bolstad, MD/PhD, Head of tumor marker group, Division of clinical medicine, Dept of medical biochemistry, OUH

*There is considerable overlap between the different MS research groups and most participants are members of more than one group

Research profile and aims

Therapeutic trials and vaccine studies in multiple sclerosis (MS) research group at the Department of Neurology, OUH and UiO, aims to perform clinical studies in close collaboration with basal scientists. This translational focus is maintained in all ongoing studies. We aim to contribute to better treatment of persons with MS and to a better understanding of the underlying mechanisms of the disease. We perform clinical, immunological, MRI and genetic studies of MS in collaboration with national and international research partners and networks.





Ongoing projects

- NOR-MS: a national multicenter non-inferiority study of two highly efficient MS therapies; cladribine and rituximab (national coordinator)
- NevroVAX: a national study of immune responses to vaccines in persons with MS (founder, collaborator)
- OVERLORD MS: local PI and responsible for the primary endpoint of the national multicenter non-inferiority study of two highly efficient MS therapies (ocrelizumab and rituximab), lead from Haukeland University Hospital
- HMAS for MS ved OUS: a prospective study of persons with MS treated with stem cell therapy at OUH (leader of expert group)
- NORSEMAN MS: clinical study randomizing progressive MS patients to NAD or placebo (local PI, not initiated)
- IMPROVE MS: 5 years extension of NOR-MS (HSØ scholarship, main supervisor, not initiated)
- IMPROVIZE MS: imaging chronic active lesions in MS (HSØ scholarship, co supervisor, not initiated)
- Back to the B-ginning: the source of pathogenic B cells in MS (HSØ scholarship, co supervisor, not initiated)
- epiNOR-MS: personalized MS treatment (DAM scholarship, co supervisor, initiated)
- Personalized rituximab-treatment (DAM scholarship, co supervisor, initiated)
- EBV-MS: partner in an EU Horizon project, with active role in WP2: clinical studies.
TAF0: collecting saliva from pwMS treated with MS (local PI)
TAF1: clinical study randomizing patients treated with natalizumab to placebo or Tenofovir Alafenamide Fumarate (TAF) as add-on treatment (local PI)
TAF2/TARGET MS: clinical study randomizing patients treated with cladribine to placebo or TAF as add on-treatment (planning stage) (international coordinator)

Most important national and international collaborators

National

- Fridtjof Lund-Johansen, Ludvig Munthe, Jon Torgils Waage, Dept of Immunoglogy, OUH
- Siri Mjåland, Asia Wolf, FHI
- Trygve Bergeland, Kappa biosciences
- Nils Bolstad, Johanna Gehin, Åge Brustad, Dept of Medical Biochemistry, OUH
- Andreas Lossius, Inst of Basic Medical Sciences, UiO
- Mona Beyer, Rigmor Lundby, Piotr Sowa, Atle Bjørnerud, Wibeke Nordhøy, Frode Tuvnes, Div. of Radiology and Nuclear Med., OUH
- Trygve Holmøy, Dept of Neurology, Ahus
- Øivind Torkildsen, Stig Wergeland and Jan Aarseth, Haukeland University Hospital
- Åslaug Lorentzen, Stine Schikora-Rustad, Ingvild Leknes, Åse Mygland, Dept of Neurology, Sørlandet

International

- Pablo Villoslada, Hospital Clinic of Barcelona, Spain, on behalf of the Sys4MS consortium
- Stephen Sawcer, University of Cambridge, UK
- Tobias Granberg, Fredrick Piehl, Karolinska Institute, Stockholm, Sweden
- Kaj Blennow and Henrik Zetterberg, Sahlgrenska University Hospital, Gothenburg, Sweden
-





Sykehus

- Clinicians from collaborating hospitals in Tromsø, Trondheim, Stavanger, Skien, Drammen, Tønsberg, Lillehammer and Fredrikstad
- Lars Westlye and Esten, Dept of Psychology, UiO and NORMENT, OUH
- Mathias Toft, Dept of Neurology, UiO/OUH
- John-Anker Zwart, FOU, OUH/UiO

Funding

- South-Eastern Norway Regional Health Authority (NOR-MS, Nevrovax post doc, IMPROVE MS (NOR-MS extension), IMPROVIZE MS (imaging, chronic active lesion))
- The Research Council of Norway (NOR-MS)
- University of Oslo (research position)
- Dam Foundation (Nevrovax PhD, epiNOR-MS, personalized MS treatment)
- Odd Fellow Foundation (NOR-MS, Nevrovax)
- Oslo MS foundation (NOR-MS)
- CEPI (Nevrovax)
- Kappa (Nevrovax)
- EU Horizon (EBV-MS)

Scientific production of the research group in 2023

Nygaard GO, Holmøy T (2024)

"Norwegian health service should offer stem cell therapy for multiple sclerosis"

Tidsskr Nor Laegeforeningen, 144 (2)

DOI [10.4045/tidsskr.23.0770](https://doi.org/10.4045/tidsskr.23.0770), PubMed [38349100](https://pubmed.ncbi.nlm.nih.gov/38349100/)

Wolf AS, Ravussin A, König M, Øverås MH, Solum G, Kjønstad IF, Chopra A, Holmøy T, Harbo HF, Syversen SW, Jørgensen KK, Høgestøl EA, Vaage JT, Celius EG, Lund-Johansen F, Munthe LA, Nygaard GO, Mjaaland S (2023)

"T cell responses to SARS-CoV-2 vaccination differ by disease-modifying therapy for multiple sclerosis"

JCI Insight, 8 (12)

DOI [10.1172/jci.insight.165111](https://doi.org/10.1172/jci.insight.165111), PubMed [37159281](https://pubmed.ncbi.nlm.nih.gov/37159281/)

Tran TT, Vaage EB, Mehta A, Chopra A, Tietze L, Kolderup A, Anthi A, König M, Nygaard G, Lind A, Müller F, Nissen-Meyer LS, Magnus P, Trogstad L, Mjaaland S, Søraas A, Midtvedt K, Åsberg A, Barratt-Due A, Medhus AW, Høivik ML, Lundin K, Karlsen RF, Dahle R, Danielsson K et al. (2023)

"Author Correction: Titers of antibodies against ancestral SARS-CoV-2 correlate with levels of neutralizing antibodies to multiple variants"

NPJ Vaccines, 8 (1), 4

DOI [10.1038/s41541-023-00600-6](https://doi.org/10.1038/s41541-023-00600-6), PubMed [36697432](https://pubmed.ncbi.nlm.nih.gov/36697432/)

Social Media; Facebook: «Multippel Sklerose Forskningsgruppen Oslo»





Multiple Sclerosis (MS) – Imaging studies



Group Leaders

Einar August Høgestøl, Associate Professor and Resident in Neurology,
MD/PhD, Psychological Dept., UiO (einaan@uio.no) and Dept. of Neurology,
OUH (eiaand@ous-hf.no)



Hanne Flinstad Harbo, Professor and Consultant of Neurology (MD/PhD/MHA), UiO
(h.f.harbo@medisin.uio.no) and Dept. of Neurology, OUH (uxhahb@ouf-hf.no)

Group members

- Gro Owren Nygaard, MD/PhD, Consultant, Dept of Neurology, OUH
- Synne Brune, MD/PhD fellow, Resident, Dept of Neurology, OUH
- Lars L. Skattebøl, MD/PhD fellow, Resident, Dept of Neurology, OUH, UiO
- Gisle Berg Helland, MD/PhD fellow, Department of Neurology, OUH
- Bettina Újhelyi, MSc student, Erasmus scholarship, University of Trento, Italy

Associated Group Members

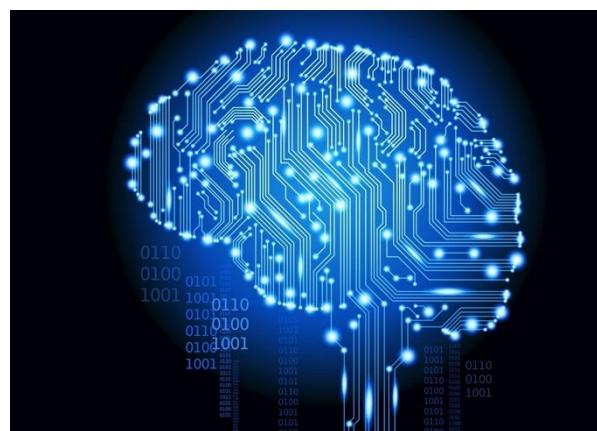
- Piotr Sowa, MD/PhD, Consultant, Division of Radiology and Nuclear Medicine, OUH
- Rigmor Lundby, MD/PhD, Consultant, Division of Radiology and Nuclear Medicine, OUH
- Mona K Beyer, MD/PhD, Professor, Division of Radiology and Nuclear Medicine UiO/OUH

This year we have had two students connected to our group, writing student theses:

- Kathinka Røising, UiO (Celsius, Høgestøl)
- Daniel Aakhus, UiO (Høgestøl, Beyer)

Research profile and aims

The research group “Imaging studies of MS” at OUH and UiO, aims to integrate imaging studies in our ongoing translational projects. We aim to investigate new advanced imaging methods to exploit the vast data incorporated in the MRI scans that our study participants undergo. We have our own MRI lab at Domus Medica 4 at Gaustad for advanced processing of MRI data. Our aim is to help establish new imaging biomarkers for improved precision medicine in MS care.





Ongoing projects

We have several ongoing projects where we collaborate extensively with local and international partners. We are, furthermore, active associated members of the Magnetic Resonance Imaging in MS Consortium (<https://www.magnims.eu>), International MS Genetics Consortium ([International Multiple Sclerosis Genetics Consortium – IMSGC](#)) and partners and work package leader (Harbo) in Multiple MS ([Home - MultipleMS](#)), an EU Horizon 2020 project.

In the **MultipleMS** ([Home - MultipleMS](#)), Prof. Hanne F. Harbo is PI and work package leader. The consortium has more than 20 academic partners and aims at developing novel personalized medicine approaches for MS patients. We are working actively in the MRI working group to be a part of the ongoing and future imaging work related to this project. This will also be prolonged in the new WISDOM-project with another 5 year of follow-up (<https://emsp.org/projects/wisdom/>).

NOR-MS (<https://www.ous-research.no/nor-ms>): an ongoing national randomized controlled trial to compare the effect of the off-label drug rituximab against cladribine for use in relapsing remitting MS patients.

OVERLORD-MS (<https://helse-bergen.no/kliniske-studier/okrelizumab-versus-rituximab-som-behandling-for-tidlig-attakvis-multippel-sklerose-overlord-ms>): an ongoing national randomized controlled trial to compare the use of two anti-CD20 drugs (ocrelizumab and rituximab) for newly diagnosed patients with MS. We are the MRI reading center and running the advanced MRI analyses in this project.

MAGNIMS Consortium (<https://www.magnims.eu>): We are leading a project investigating multishell diffusion weighted imaging in MS in normal appearing white matter and in lesions. In addition, we are contributing to several ongoing and previous projects.

- Synne Brune: PhD fellow: MRI and Neurofilament as biomarkers in Multiple sclerosis. Supervisor: Hanne F Harbo, Co supervisors: Mona K Beyer and Pål Berg-Hansen
- Lars L Skattebøl, PhD fellow: Advanced MRI in the clinical study NOR-MS. Supervisors Gro Nygaard, Einar A. Høgestøl, Hanne F Harbo
- Hanne F. Harbo, Steffan D. Bos, Pål Berg-Hansen, Tone Berge, Elisabeth G Celius, Mona Beyer, Einar A. Høgestøl, Synne Brune, Goran Petrovski, Dragana Drobnjak Nes, Sigrid Aune de Rodez Benavent: MultipleMS - partner in EU Horizon 2020-project (Harbo Oslo PI)
- Hanne F. Harbo, Einar A. Høgestøl, Sigrid de Rodez Benavent, Steffan Bos, Tone Berge, Synne Brune, Elisabeth G Celius, Mona Beyer: Sys4MS- Bitek 2021/NFR Project. (Harbo Oslo PI)
- Einar A. Høgestøl, Hanne F. Harbo and others: Brain age in MS with Tobias Granberg, Karolinska Institute, Sweden
- Einar A. Høgestøl, Hanne F. Harbo, Elisabeth Celius, Piotr Sowa, Mona K Beyer: MAGNIMS collaboration on various MRI projects
- Einar A. Høgestøl, Hanne F. Harbo, Elisabeth Celius, Piotr Sowa, Mona K Beyer: NORMENT collaboration on various MRI projects
- Gro O. Nygaard, Hanne F Harbo, Einar A. Høgestøl and more: NOR-MS. Norwegian multicenter study of cladribine and rituximab (NOR-MS) collaboration on various MRI projects
- Gro O. Nygaard, Einar Høgestøl, Lars L Skattebøl, Piotr Sowa, Hanne F Harbo, Kristin Wesnes (St Olavs Hospital): 7T MRI in NOR-MS





- Gro O. Nygaard, Rigmor Lundby, Einar A. Høgestøl, Mathias Øverås, Hanne F. Harbo: OVERLORD-MS

Most important national and international collaborators

National

- Mona K. Beyer, Rigmor Lundby, Piotr Sowa, Atle Bjørnerud and Bradley MacIntosh, Div. of Radiology and Nuclear Med., OUH
- Lars Westlye and Nils Inge Landrø, Dept of Psychology, UiO
- Ole A. Andreassen, Lars T. Westlye, Tobias Kaufmann, Torbjørn Elvsåshagen, Ivan Maximov, Dag Alnæs, Esten Leonardsen, NORMENT, OUH/UiO
- Øivind Torkildsen, Stig Wergeland, Kjell-Morten Myhr and Jan Harald Aarseth, Haukeland University Hospital
- Geir Ringstad, Per Kristian Eide and Erik Melin, Div. of Radiology and Nuclear Med., OUH

International

- Ingrid Kockum, on behalf of the MultipleMS consortium
- Mara Rocca, Christina Einzinger, Frederik Barkhof, on behalf of the MAGNIMS consortium
- Pablo Villoslada, Hospital Clinic of Barcelona, Spain, on behalf of the Sys4MS
- Tobias Granberg, Fredrick Piehl, Karolinska Institute, Stockholm, Sweden
- Hanneke Hulst, Leiden University, Netherland

Funding

- South-Eastern Norway Regional Health Authority
- The Research Council of Norway
- University of Oslo
- European Commission: EU Horizon 2020
- European Commission/The Research Council of Norway: Sys4MS - Biotek 2021
- South-Eastern Norway Regional Health Authority grant
- Unrestricted research grants from Novartis, Biogen, Sanofi Genzyme, Merck
- Odd Fellow Foundation, Forsberg and Aulie, Ingrid and Fritz Nilsen, UNIFOR
- Oslo MS Foundation

Scientific production of the research group in 2023

Peer reviewed original research articles: 5

Selected publications:

Martí-Juan G, Sastre-Garriga J, Martínez-Heras E, Vidal-Jordana A, Llufrí S, Groppa S, Gonzalez-Escamilla G, Rocca MA, Filippi M, **Høgestøl EA**, **Harbo HF**, Foster MA, Toosy AT, Schoonheim MM, Tewarie P, Pontillo G, Petracca M, Rovira À, Deco G, Pareto D.

"Using The Virtual Brain to study the relationship between structural and functional connectivity in patients with multiple sclerosis: a multicenter study"

Cereb Cortex. 2023 Jun 8;33(12):7322-7334

<https://doi.org/10.1093/cercor/bhad041>.





Fleischer V, Gonzalez-Escamilla G, Pareto D, Rovira A, Sastre-Garriga J, Sowa P, **Høgestøl EA, Harbo HF**, Bellenberg B, Lukas C, Ruggieri S, Gasperini C, Uher T, Vanekova M, Bittner S, Othman AE, Collorone S, Toosy AT, Meuth SG, Zipp F, Barkhof F, Ciccarelli O, Groppa S.

"Prognostic value of single-subject grey matter networks in early multiple sclerosis"

Brain. 2024 Jan 4;147(1):135-146.

<https://doi.org/10.1093/brain/awad288>.

Andorra M, Freire A, Zubizarreta I, de Rosbo NK, **Bos SD**, Rinas M, **Høgestøl EA, de Rodez Benavent SA**, **Berge T, Brune-Ingebretsen S**, Ivaldi F, Cellerino M, Pardini M, Vila G, Pulido-Valdeolivas I, Martinez-Lapiscina EH, Llufrui S, Saiz A, Blanco Y, Martinez-Heras E, Solana E, Bäcker-Koduah P, Behrens J, Kuchling J, Asseyer S, Scheel M, Chien C, Zimmermann H, Motamed S, Kauer-Bonin J, Brandt A, Saez-Rodriguez J, Alexopoulos LG, Paul F, Harbo HF, Shams H, Oksenbergs J, Uccelli A, Baeza-Yates R, Villoslada P.

"Predicting disease severity in multiple sclerosis using multimodal data and machine learning"

J Neurol. 2024 Mar;271(3):1133-1149.

<https://doi.org/10.1007/s00415-023-12132-z>. Epub 2023 Dec 22.

Presentations at international congresses:

EAN, Budapest, 2023: Újhelyi – “Predicting cognitive outcomes using deep learning derived brain aging in people with multiple sclerosis”, ePoster Presentation.

ECTRIMS, Milan, 2023: MAGNIMS collaboration presented by Gerard Martí-Juan – “Investigating the balance between inter- and intrahemispheric connectivity brain structural connectivity in multiple sclerosis. Validation in a multi-center study”

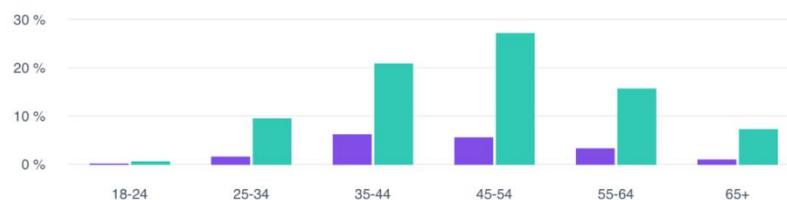
Social Media: Facebook: «Multippel Sklerose Forskningsgruppen Oslo»

Publikum

1 526 Facebook-følgere

Alder og kjønn

- █ Menn 18.20%
- █ Kvinner 81.80%



Hurra! I går feiret vi at vi er igang med inklusjon til den utrolig spennende og viktige TAF1-studien. Dette er det andre trinnet i en tre-trinns rakkett fra det store EU-prosjektet ledet av Haukeland. Første trinn var screening for EBV i spytte. Vi tilbød alle våre 40 Natalizumab-brukere å delta. Nå...
ti. 23. apr.

Rekkevidde for innlegg 6 656 Engasjement 1 140 Frem innlegg



Da var Solstrand møtet over for denne gang. Vi reiser herfra med en følelse av at dette er virkelig viktig for å løfte kvaliteten på MS-oppfølgingen nasjonalt i alle ledd. Det er et utrolig engasjement hos alt helsepersonell, og dette får oss til å dra i samme retning. I tillegg har det vært en flott sosia...
to. 25. apr.

Rekkevidde for innlegg 3 527 Engasjement 786 Frem innlegg



Vi ønsker at norsk helsevesen skal tilby stamcellebehandling til de som trenger det. Gro Nygaard og Trygve Holmøy har skrevet kronikk om stamcellebehandling i tidsskriftet for den norske legeforeningen. <https://tidsskriftet.no/2024/02/kronikk/norsk-helsevesen-bor-tilby-...> on. 7. feb.

Rekkevidde for innlegg 1 526 Engasjement 300 Frem innlegg



Denne våren skal to studenter fra Bioteknologi og kjemi-ingeniørstudiet ved OsloMet utføre sitt Bachelor prosjekt hos oss. Marte Slåttsveen og Mia Sivertsvik Henriksen skal jobbe med prosjektet epiNOR-MS-identifisering av epigenetiske biomarkører for behandlingsrespons, et trinn på veien...
to. 8. feb.

Rekkevidde for innlegg 1 001 Engasjement 244 Frem innlegg





Multiple Sclerosis (MS) – Molecular and immunological studies



Group Leaders

Tone Berge, Head of Section, Neuroscience Research Unit, Dept. of Research and Innovation, Div. of Clinical Neuroscience, OUH (tone.berge@ous-research.no/tonebe@ous-hf.no) and Professor, OsloMet



Hanne Flinstad Harbo, Professor and Consultant of Neurology (MD/PhD/MHA), UiO (h.f.harbo@medisin.uio.no) and Dept. of Neurology, OUH (uxhahb@ouf-hf.no)

Group members

- Chiara Cappelletti (MSc), PhD fellow OsloMet and Engineer OUH
- Synne Brune-Ingebretsen (MD), PhD fellow UiO and Consultant of neurology OUH
- Linda M. Pedersen (MSc, PhD), Associate Professor OsloMet and Researcher OUH
- Mathias H. Øverås (MD), PhD fellow UiO, Dept of Neurology, OUH
- Bachelor students, OsloMet; Fredrikke Juvodden and Kristine Einås
- Master student, NTNU Nora Emini

Associate members*

- Gro O. Nygaard (MD, PhD), Researcher and Consultant of Neurology, OUH
- Elisabeth Gulowsen Celius (MD, PhD), Professor UiO, Consultant of Neurology OUH
- Einar August Høgestøl (MD, PhD), Researcher OUH, Associate Professor UiO
- Steffan D. Bos (Msc, PhD), Researcher Cancer Registry of Norway
- Ina S. Brorson (Msc, PhD), Post doc, UiO
- Kristina Gervin (MSc, PhD), Senior Researcher OUH

*There is considerable overlap between the different MS research groups and most participants are members of more than one group

Research profile and aims

The molecular and immunological MS studies research group aims to identify and characterize genes and biological pathways important for MS disease onset, progression and treatment response. By performing molecular studies in selected immune cells, we aim at contributing to understand the biological significance behind MS susceptibility genes identified through global “omics” approaches. Additionally, we aim at identifying novel biomarkers, which in the future will guide the clinicians in the follow-up of people with MS, being an important step towards precision medicine.





Ongoing projects

- epiNOR-MS: Identification of epigenetic biomarkers for treatment response in Multiple Sclerosis - implications for precision medicine
- An advanced study of Multiple Sclerosis and Parkinson's Disease big-data to identify molecular mechanisms for disease risk
- Proteomic approaches to identify dysregulation of T cells in MS
- Neurofilament as an MS disease marker
- Multiple sclerosis and aging – a real world, population-based cohort study
- MultipleMS – an EU project led by Karolinska Institute in Stockholm – aims at developing novel personalized medicine approaches for MS patients, Harbo is work package leader.
- International MS Genetics Consortium, aiming at identifying genomic components increasing the risk for disease onset and progression.

Most important national and international collaborators

National

- Mathias Toft, Dept of Neurology, UiO/OUH
- John Anker Zwart, FOU OUH/UiO
- Allicia Llorente, Inst of Cancer Research, OUH
- Hans-Christian Aas, Core Facility for Flow cytometry, OUH
- Kaja Selmer, FOU OUH
- Cecilia Smith Simonsen, Vestre Viken Hospital, Drammen
- Mona Beyer, Neuroradiolgy, OUH
- Randi Eikeland, University of Agder and Sørlandet Hospital
- Åslaug Lorentzen, Sørlandet Hospital

International

- Pablo Villoslada, Hospital Clinic of Barcelona, Spain
- Stephen Sawcer, University of Cambridge, UK
- Kaj Blennow and Henrik Zetterberg, Sahlgrenska University Hospital, Gothenburg, Sweden
- Ingrid Kockum and Maja Jagodic, Karolinska Institute, Stockholm, Sweden
- Dr. Vicky Maltby, University of Newcastle, Australia
- The International MS Genetics Consortium

Funding

- South-Eastern Norway Regional Health Authority
- EU horizon 2020, MultipleMS
- University of Oslo
- Oslo University Hospital
- OsloMet
- Odd Fellow Foundation
- Oslo MS foundation
- Halvor Høies fond

Scientific production of the research group in 2023

Peer reviewed original research articles: 12





Selected publications:

Brune-Ingebretsen S, Høgestøl EA, de Rosbo NK, Berg-Hansen P, Brunborg C, Blennow K, Zetterberg H, Paul F, Uccelli A, Villoslada P, Harbo HF, Berge T.

[Immune cell subpopulations and serum neurofilament light chain are associated with increased risk of disease worsening in multiple sclerosis.](#)

J Neuroimmunol. 2023 Aug 7;382:578175. doi: 10.1016/j.jneuroim.2023.578175

International Multiple Sclerosis Genetics Consortium; MultipleMS Consortium. Harroud, A., Stridh, P., McCauley, J. L., Saarela, J., van den Bosch, A. M. R., Engelenburg, H. J., Beecham, A. H., Alfredsson, L., Alikhani, K., Amezcuia, L., Andlauer, T. F. M., Ban, M., Barcellos, L. F., Barizzone, N., **Berge, T.**, Berthele, A., Bittner, S., **Bos, S. D.**, Briggs, F. B. S., Caillier, S. J., Calabresi, P. A., Caputo, D., Carmona-Burgos, D. X., Cavalla, P., **Celius, E. G.**, Cerono, G., Chinea, A. R., Chitnis, T., Clarelli, F., Comabella, M., Comi, G., Cotsapas, C., Cree, B. C. A., D'Alfonso, S., Dardiotis, E., De Jager, P. L., Delgado, S. R., Dubois, B., Engel, S., Esposito, Marzena J Fabis-Pedrini, Massimo Filippi, Kathryn C Fitzgerald, Christiane Gasperi, F., Gomez, L., Gomez, R., Hadjigeorgiou, G., Hamann, J., Held, F., Henry, R. G., Hillert, J., Huang, J., Huitinga, I., Islam, T., Isobe, N., Jagodic, M., Kermode, A. G., Khalil, M., Kilpatrick, T. J., Konidari, I., Kreft, K. L., Lechner-Scott, J., Leone, M., Luessi, F., Malhotra, S., Manouchehrinia, A., Manrique, C. P., Martinelli-Boneschi, F., Martinez, A. C., Martinez-Maldonado, V., Mascia, E., Metz, L. M., Midaglia, L., Montalban, X., Oksenberg, J. R., Olsson, T., Oturai, A., Pääkkönen, K., Parnell, G. P., Patsopoulos, N. A., Pericak-Vance, M. A., Piehl, F., Rubio, J. P., Santaniello, A., Santoro, S., Schaefer, C., Sellebjerg, F., Shams, H., Shchetynsky, K., Silva, C., Siokas, V., Søndergaard, H. B., Sorosina, M., Taylor, B., Vandebergh, M., Vasileiou, E. S., Vecchio, D., Voortman, M. M., Weiner, H. L., Wever, D., Yong, V. W., Hafler, D. A., Stewart, G. J., Compston, A., Zipp, F., **Harbo, H. F.**, Hemmer, B., Goris, A., Smolders, J., Hauser, S. L., Kockum, I., Sawcer, S. J., Baranzini, S. E., Harroud, A., Jónsdóttir, I., Blanco, Y., Llufriu, S., Madireddy, L., Saiz, A., Villoslada, P., Stefánsson, K.

[Locus for severity implicates CNS resilience in progression of multiple sclerosis.](#)

Nature. 2023 Jul;619(7969):323-331. doi: 10.1038/s41586-023-06250-x.

König M, Lorentzen ÅR, Torgauten HM, Tran TT, Schikora-Rustad S, Vaage EB, Mygland Å, Wergeland S, Aarseth J, Aaberge IAS, Torkildsen Ø, Holmøy T, **Berge T**, Myhr KM, **Harbo HF**, Andersen JT, Munthe LA, Søraas A, **Celius EG**, Vaage JT, Lund-Johansen F, **Nygaard GO**.

"Humoral immunity to SARS-CoV-2 mRNA vaccination in multiple sclerosis: the relevance of time since last rituximab infusion and first experience from sporadic revaccinations"

J Neurol Neurosurg Psychiatry. 2023 Jan;94(1):19-22. doi: 10.1136/jnnp-2021-327612

Other publications

Bachelor thesis (20 ECTS), in Norwegian:

Biomarkører ved multippel Sklerose (MS).

Fredrikke Juvodden and Kristine Einås

Social Media;

Facebook: «Multippel Sklerose Forskningsgruppen Oslo»

Twitter: FOU Nevroklinikken @FOU_Nevrokl





Brain plasticity and neuropsychiatry



Group Leader

Torbjørn Elvsåshagen; MD., PhD; Department of Neurology, OUH (telvsaha@ous-hf.no)
Norwegian Centre for Mental Disorders Research (NORMENT), UiO, and Department of Behavioral Medicine, UiO (torbjorn.elvsashagen@medisin.uio.no)

Group Members

- Erlend Bøen; MD, PhD; OUH
- Britta Bürker; MD, PhD; OUH/UiO
- Guro Dunvoll; MSc, PhD research fellow; OUH/UiO/OsloMet
- Astrid Gjerdrum Hornslien; PhD; OUH
- Torfinn Hynnekleiv; MD; OUH and Innlandet Hospital Trust
- Katalin Juhasz; MD; Akershus University Hospital
- Eva A. Malt; MD, PhD; Assoc. professor; Inst. of Clinical Medicine, UiO
- Ulrik F. Malt; MD, PhD; Professor emeritus; Inst. of Clinical Medicine, UiO
- Verónica Mäki-Marttunen; PhD; OUH
- Kåre Osnes; MD, PhD; Diakonhjemmet Hospital
- Anne Gro Parnemann; PhD research fellow; OUH/UiO
- Torunn Søyseth; MSc; OUH
- Mathias Valstad; MSc, PhD research fellow; OUH/UiO
- Nathalia Zak; MD, PhD; OUH

Associated Group Members

- Stein Andersson; PhD., Professor; Dept of Psychology, UiO
- Atle Bjørnerud; PhD., Professor; OUH
- Birgitte Boye; MD., PhD., Professor; Inst. of Basic Medical Sciences, UiO
- Torgeir Moberget; PhD., Postdoc; OUH
- Elena Kondratskaya; M.Sc., PhD.; OUH
- Nina Bang; M.Sc., PhD. research fellow; NTNU

Research profile and aims

Our group conducts research in the fields of adult brain plasticity and neuropsychiatry. Plasticity – the capacity for change – is increasingly recognized as an intrinsic property of the adult brain and may play important roles in the etiologies and treatments of neurological and psychiatric illnesses. Neuropsychiatry recognizes that the brain and mind are one, that mental illnesses are disorders of the brain, and that psychiatric symptoms are commonly found in neurological disorders. One important goal of neuropsychiatric research is to bridge the gap between neurology and psychiatry.

Among the main aims of our current research are:

- To examine whether structural and functional brain plasticity are core characteristics of the human sleep-wake cycle
- To increase our understanding of how novel schizophrenia- and bipolar disorder-associated genetic variants affect synaptic function and plasticity
- To examine the role of brainstem and thalamus regions in neuropsychiatric and neurological disorders





Ongoing projects

- Brainstem and thalamus volumes: genetic architectures and roles in neuropsychiatric and neurological disorders
- Sleep-wake-dependent brain plasticity in health and depression
- Genes, synaptic function, and stem cells in bipolar disorder, schizophrenia, and autism spectrum disorder: from pathophysiology towards personalized medicine
- Brain plasticity and psychobiology in bipolar II disorder and borderline personality disorder
- Studies of genotype-phenotype interactions in the 3q29 microdeletion syndrome
- Neuropsychiatry and coping in heart and lung transplantation
- Non-invasive human LTP-like plasticity – examining robustness, functional significance and clinical utility of a novel biomarker

Most important national and international collaborators

National

- Prof. Ole A. Andreassen, NORMENT, UiO/OUH
- Prof. Erik Jönsson, NORMENT, UiO
- Prof. Srdjan Djurovic, NORMENT, UiO
- Ass. prof. Lars T. Westlye and Dr. Tobias Kaufmann, NORMENT, UiO
- Prof. Bjørn Bjorvatn, Norwegian Competence Center for Sleep Disorders, Bergen
- Dr. Stine Knudsen, C. of Exp. for Neurodevelopmental Disorders and Hypersomnias, OUH
- Prof. Gaute Einevoll, NMBU/UiO
- Prof. Gulowsen Celius, Prof. Harbo, Ass. Prof. Høgestøl, dr. Gro Nygaard; MS groups, OUH
- Dr. Marte Wendel-Haga, Vestfold Hospital Trust, Kysthospitalet
- Dr. Sigrid Svalheim and Dr. Line Sveberg, OUH

International

- ENIGMA groups (Enhancing NeuroImaging Genetics through Meta-Analysis)
- EURONET-SOMA: European Research Network on somatoform disorders; group leader: Prof. Bernd Löwe, Uni Hamburg-Eppendorf, Abt. Für Psychotherapie und Psychosomatische Medizin, Germany
- Director Marta Bianciardi, Martinos Center for Biomedical Imaging/Harvard Medical School, USA
- Ass. Prof. David L. Perez, Harvard Medical School, USA

Funding

- South-Eastern Norway Regional Health Authority
- Norwegian Competence Center for Sleep Disorders
- Oslo University Hospital
- Throne-Holst Foundation
- Ebbe Frøland Foundation





Scientific production of the research group in 2023

Doctoral thesis: 1

Mathias Valstad:

"Examining schizophrenia and bipolar disorder pathophysiology with an EEG-based assay of cortical synaptic plasticity"

Principal supervisor: T. Elvsåshagen. Dissertation 20.01.23.

Peer reviewed original research articles: 28

Selected publications:

Mäki-Marttunen V, et al.:

"Functional connectivity of the visual cortex in chronic migraine before and after medication withdrawal therapy"

Neuroimage Clin 40, 103543 (2023). <https://doi.org/10.1016/j.nicl.2023.103543>

Pentz A, et al.:

"Mismatch negativity in schizophrenia spectrum and bipolar disorders: Group and sex differences and associations with symptom severity"

Schizophr Res 261, 80-93 (2023). <https://doi.org/10.1016/j.schres.2023.09.012>

Zak N, et al.:

"Baseline long-term potentiation-like cortical plasticity is associated with longitudinal cortical thinning in healthy adults and in adults with bipolar disorder type II"

Eur J Neurosci 58, 2824-2837 (2023). <https://doi.org/10.1111/ejn.16038>





Cognitive Health Research group (CoHR)



Group Leader

Ira Ronit Hebold Haraldsen, MD/PhD, OUH (iharaldse@ous-hf.no)

Group Members

- Vebjørn Anderson, BSc, stud.med., ass. coordinator, OUH
- Hanna Haraldsen, ass. Project manager, OUH
- Catherine Faye, project manager and recruitment officer, OUH
- Lone Holmen, technician, OUH
- Christoffer Hatlestad, cand.psychol., Post-doc, OUH
- Thomas Tveitstøl, Phd-candidate, OUH
- Mats Tveter, Phd-candidate, OUH
- Ana Perez, cand. psychol., PhD-candidate, OUH
- Ramesh Uperti, Phd-candidate, OUH
- Rabindra Khadka, PhD-candidate, OUH
- Annette Bondi, researcher, OUH

Research profile and aims

Our aims include contribution to development of novel and innovative methods for early detection, prevention, diagnostics and treatment of neurological diseases associated with cognitive health issues. Another branch of our research is concerned with environmental and biological factors in gender development, and qualitative research into subjective experiences of adolescence gender dysphoria.

Currently, our focus is primarily centred on development of accessible and next generation AI-models in identifying and estimating dementia in people at risk. Also, the group focuses on the development of functional biomarkers of neurodegeneration with the EEG-based functional brain network models with deep learning (DL) and classic machine learning (ML) artificial intelligence methods to identify crucial features of the normal and pathological aging and its changing brain's functional integrity. Furthermore, our group wishes to innovate different predictive algorithms for the prediction of dementia and other neurodevelopmental diseases.

We are an international group of researchers coming from a variety of diverse educational backgrounds, including medicine, psychology, artificial intelligence, mathematics, physics, robotics, and biological science. Our multidisciplinary approach to the brain-behaviour relation unravelling efforts allows us to conduct research across various systems and cognitive levels; from molecules to cells to cognitive systems to behaviours.

Our broad research method portfolio includes: Electrophysiological (EEG) source reconstruction and network modelling; event-related potential (ERP) techniques; positron emission tomography (PET) and radiochemistry; neuropsychological assessment; mathematical algorithm development. Also new focus area includes prediction of health economic models when it comes to introducing DL artificial intelligence-based tools in supportive medical decision making.





Ongoing projects

- eBRAIN-Health - Digital twins for disease modelling
- AI-Mind – Intelligent digital tools for screening of brain connectivity and dementia risk estimation in people affected by mild cognitive impairment
- Identifying biomarkers for cognitive impairment

Most important national and international collaborators

National

- Erik Taubøll, UiO/OUH
- Per Magnus, FHI
- Uta Sailer, UiO
- Mathias Toft, UiO/OUH
- Randi Borgen, OUH
- Beate Rygge, Digital Life Norway
- Klas Pettersen, NORA
- Jan Bjaali, UiO, EBRAINS
- Siv Fjellkårstad, HelseDir
- Harry Hallock, DNV
- Erik Christensen, Prediagnostics
- Tormod Flatby, Ahus
- Anne-Kristin Solbak, UiO
- Ainar Drews, UiO
- Gard Thomassen, UiO
- Marte Roa Syvertsen, Vestre Viken

International

- Fernando Maestu, Madrid, Spain
- Paolo Rossini, Rome, Italy
- Camillo Mara, Rome, Italy
- Hanna Renwall, Helsinki, Finland
- Americo Cicchetti, Rome, Italy
- Tim Govers, Radboaud, The Netherlands
- Jeanette Müller, Zurich, Switzerland
- Petra Ritter, Berlin, Germany
- Laura Hughes, Cambridge, UK
- James Rowe, Cambridge, UK
- Hanna Renvall, Helsinki, Finland
- Victor Jirsa, Marseilles, France
- Huifang Wang, Marseilles, France
- Karolina Jarawka, Roche
- Stéphane Epelbaum, Eli Lilly Europe, France
- Andreas Keller, Saarland University, Germany

Scientific production of the research group in 2023

Selected publications:

Hatlestad-Hall C, Bruña R, Liljeström M, Renvall H, Heuser K, Taubøll E, Maestú F, Haraldsen IH (2023) *“Reliable evaluation of functional connectivity and graph theory measures in source-level EEG: How many electrodes are enough?”*

Clin Neurophysiol, 150, 1-16

DOI [10.1016/j.clinph.2023.03.002](https://doi.org/10.1016/j.clinph.2023.03.002), PubMed [36972647](https://pubmed.ncbi.nlm.nih.gov/36972647/)

Thyness C, Steinsbekk A, Andersson V, Grimstad H (2023)

“What Aspects of Supervised Patient Encounters Affect Students’ Perception of Having an Excellent Learning Outcome? A Survey Among European Medical Students”

Adv Med Educ Pract, 14, 475-485

DOI [10.2147/AMEP.S391531](https://doi.org/10.2147/AMEP.S391531), PubMed [37213207](https://pubmed.ncbi.nlm.nih.gov/37213207/)

Funding

- EU Horizon: HORIZON-INFRA-2021-TECH-01-01
- Horizon 2020: H2020-SC1-BHC-06-2020
- HumanBrainProject: eBrain HealthDataCloud





Department of Research and Innovation

The overarching goal of the Department of Research and Innovation is to help facilitate high quality research across the departments at the Division of Clinical Neuroscience.

There are four sections; the neuroscience research lab, the neuroscience registry and biobank, the research unit for musculoskeletal health (FORMI), which also encompasses patient and public involvement in research and the clinical trial unit which facilitates industry-sponsored clinical trials.

Each unit in the department constitutes a research group.

The Department of Research and Innovation is headed by Professor John-Anker Zwart.





Musculoskeletal health



Group Leader

Kjersti Storheim, MD/PhD, Professor OsloMet, Head of Section for Research and Communication Unit for Musculoskeletal Health; FORMI, OUEH
(uxskje@ous-hf.no)

Group members

- Lars Christian Haugli Bråten, MD/Postdoctoral fellow, OUEH
- Elisabeth Gjefsen, MD/PhD fellow, OUEH
- Ingrid Heuch, MD/Senior Researcher, OUEH
- Margreth Grotle, Professor, OUEH/OsloMet
- Synne Øien Stensland, MD/ Senior researcher, OUEH and NKVTS
- Eira Ebbs, Msc/PhD fellow/research coordinator, OUEH
- Astrid Lunestad, User representative
- Ingrid Fjeldheim Bånerud, Msc/Administrative, OUEH
- Mads Peder Rolfsen, MD/PhD fellow, OUEH
- Amy Martinsen, Msc/PhD fellow/Research coordinator, OUEH
- Marianne Mørk, Msc/PhD fellow, OUEH
- Gøril Brevik Melbye, Msc/Phd fellow, OUEH
- Christer Mjåset, MD/PhD fellow, OUEH
- Iris Fortes Corona, MSc/Administrative, OUEH
- Maren Hjelle Guddal, PhD fellow, OUEH
- Helle Stangeland, PhD fellow and research coordinator, OUS and NKVTS
- Monica Baumann- Larsen, MD/PhD fellow, OUEH
- Maria Dehli Vigeland, PhD fellow, OUEH
- John Anker Zwart, Professor, OUEH/Uo
- Sverre M Mjønes, PhD fellow, AHUS

Associated Group Members

- Ida Løchting, PhD/Postdoctoral fellow, OUEH and OsloMet
- Fiona Aanesen, MSc / Research coordinator, OUEH
- Olaf Fjeld, MD/post.doctoral fellow, OsloMet and OUEH
- Vibeke Siewers, Research coordinator, OUEH
- Ørjan Nesse Vigdal, Msc/PhD fellow, OsloMet
- Christian Hellum, MD/PhD, OUEH
- Rikke M Killingmo, PT, PhD, OsloMet

Research profile and aims

The focus of our research group is to generate research-based knowledge which improve the health and care of people who have, or are at risk of, musculoskeletal health conditions. Our research priorities include clinical trials evaluating effect and cost benefit of treatment for people with musculoskeletal conditions, population health and prevention, registry studies, health literacy and coping, user





involvement in research and dissemination. Our research group is multidisciplinary and incorporate a wide range of different methods from epidemiology and randomised placebo-controlled trials to laboratory science and genetics.

Ongoing projects

Clinical trials

- BackToBasic; TNF alfa blocker treatment of chronic low-back pain with Modic changes, a randomized double blind multicenter placebo-controlled trial
- The AIM-study (Antibiotics In Modic changes); antibiotic treatment of chronic low-back pain with Modic changes, a randomised double blind multicenter placebo controlled trial
- The NORwegian Degenerative spinal STENosis-trial (the NORDSTEN-study); a multicentre study embracing two RCTs evaluating different surgical technics and one observational cohort in patients with spinal stenosis with or without degenerative slip
- The MI-NAV project: Can Motivational Interviewing facilitate Return-to-Work in sicklisted people with musculoskeletal disorders? A randomised trial within NAV
- The Lumbar Interbody Fusion vs. Multidisciplinary Rehabilitation (LIFEHAB) trial; a multicentre RCT evaluating the effect of fusion surgery versus multidisciplinary rehabilitations in patients with chronic low back pain and degenerative changes seen on MRI
- Epigenetic and molecular biomarkers in chronic low back pain and Modic changes. A case-control study in patients with or without Modic changes scheduled for elective surgery in the lumbar spine

Epidemiology and registry studies

- Childbirth, hormonal factors and low back pain - a prospective epidemiological survey, using data from HUNT
- Killing pain? Use of analgesic, sedative and anxiolytic medication and the development of psychiatric illness in adolescents and young adulthood, in relation to trauma
- PATHWAY: children's pathways after trauma for health and well-being through adolescence and young adulthood
- Back Pain in Elderly (BACE). A prospective cohort study of older people visiting primary care with a new episode of back pain
- Neck surgery in Norway; a register study of benchmarks for clinical improvement and prognostic models for non-success in patients operated on for cervical degenerative disorders
- Risk factors for anterior cruciate ligament injuries in Norwegian adolescents and young adults: (the ACL/HUNT studies)
- Physical activity and sport participation during adolescence and musculoskeletal complaints in adulthood. A population-based cohort study, using Young-HUNT data





Mixed methods

- Cross cultural validation of outcome measurement tool and evaluation of treatment options for patients with plantar fasciopathy
- Illness perceptions and coping with chronic illness
- People with intellectual disabilities and vulnerabilities for harmful sexual behavior and abuse
- Applying Artificial Intelligence in Developing Personalized and Sustainable Healthcare for Spinal Disorders (AID-Spine)
- Nothing About Us Without Us: Research Priorities from Patients with musculoskeletal diseases - A James Lind Alliance project for Public and Patient Involvement (PPI)
- “Skjelettnett”: network for user representatives who want to contribute to increased quality and relevance of research on musculoskeletal health conditions

Most important national and international collaborators

National

- UiO and OUH: Div. of Orthopaedic surgery; Christian Hellum, Mads P Rolfsen, Dept of Clinical Neurophysiology; Kristian Bernhard Nilsen, Dept of Physical Med. and Rehab.; Jens Ivar Brox, Dept of Clinical Microbiology; Karianne Gammelsrud, Dept of Medical Genetics; Benedicte A Lie, Norw. Center for Violence and Traumatic Stress Studies; Grete Dyb, Helene Aakvaag
- UiB and Haukeland University Hospital: Ansgar Espeland, Ivar Austevoll, Per M Kristoffersen, Kari Indrekvam, Frode Rekland, Magnhild Dagestad, Thomas E Kadar, Jörg Assmus
- NTNU and St. Olav Hospital: Gunn Hege Marchand, Fredrik Granvik
- UiS and Stavanger University Hospital: Clemens Weber, Eric Franssen
- The Arctic University of Norway and University Hospital of North Norway: Tore Solberg, Gunnstein Bakland
- OsloMet: Britt Elin Øiestad, Anne Therese Tveter, Tarjei Rysstad, Alexander Tingulstad, Rikke M Killingmo, Henriette Jahre, Bjørnar Berg, Per Solvang, Kaja Smedbråten
- Norwegian Institute of Public Health: Andrew Garratt, Karin Magnusson, Svetlana Skurtveit
- REMEDY, Diakonhjemmet Hospital: collaborators in WP7
- Østfold Hospital Trust: Anne J Haugen, Lars Grøvle

International

- Sahlgrenska Academy, Sweden; Helena Brisby
- Linköping University, Sweden; Allan Abbott
- University of Southern Denmark, Denmark; Jan Hartvigsen, Stine Clausen
- University of Sydney, Australia; Chris Maher
- Monash University, Australia; Rachel Buchbinder
- Erasmus MC, Rotterdam, the Netherlands; Bart Koes, Alessandro Chiarotto
- Vrije Universiteit, Amsterdam, the Netherlands; Raymond Ostelo, Mauritz van Tulder
- The Disc 4All consortium





- Møre and Romsdal Hospital Trust, Ålesund:
Erland Hermansen, Jørn Aarøen
- Akershus University Hospital: Oliver
Grundnes, Sverre Mjønes
- Ryggforeningen i Norge: Thor Einar
Holmgard, Inger Ljøstad, Kathrine Vadøy
- Rådet for muskelskjeletthelse

Funding

- South-Eastern Norway Regional Health Authority
- The Research Council of Norway
- Foundation Dam
- Sophies Minde Foundation
- OUH

Scientific production of the research group in 2023

Peer reviewed original research articles: 33

Selected publications:

Vigeland MD, Flåm ST, Vigeland MD, Espeland A, Zucknick M, Wigemyr M, Bråten LCH, Gjefsen E, Zwart JA, Storheim K, Pedersen LM, Selmer K, Lie BA, Gervin K, The Aim Study Group (2023) "Long-Term Use of Amoxicillin Is Associated with Changes in Gene Expression and DNA Methylation in Patients with Low Back Pain and Modic Changes" *Antibiotics (Basel)*, 12 (7)

Baumann-Larsen M, Zwart JA, Dyb G, Wentzel-Larsen T, Stangeland H, Storheim K, Stensland SØ (2023) "Killing pain? A prospective population-based study on trauma exposure in childhood as predictor for frequent use of over-the-counter analgesics in young adulthood. The HUNT study" *Psychiatry Res*, 327, 115400

Bråten LCH, Gjefsen E, Gervin K, Pripp AH, Skouen JS, Schistad E, Pedersen LM, Wigemyr M, Selmer KK, Aass HCD, Goll G, Brox JI, Espeland A, Grøvle L, Zwart JA, Storheim K, AIM-study group (2023) "Cytokine Patterns as Predictors of Antibiotic Treatment Effect in Chronic Low Back Pain with Modic Changes: Subgroup Analyses of a Randomized Trial (AIM Study)" *J Pain Res*, 16, 1713-1724





Headache and pain



Group Leader

Bendik Slagsvold Winsvold, MD/PhD, Senior Researcher and Consultant Neurology,
OUH (uxwinb@ous-hf.no)

Group members

- Amy Martinsen, PhD fellow/Research coordinator, OUH
- Sigrid Børte, Postdoctor, OUH
- Helene Engstrand Lier, PhD fellow, OUH
- Maria Bengtson Argren, PhD fellow, OUH
- John Anker Zwart, MD/PhD, OUH/Uo
- Espen Saxhaug Kristoffersen, MD/PhD, Associate professor, UiO

Research profile and aims

Our research group works to improve the understanding and treatment of headache and pain disorders. Specific focus areas are headache and pain genomics, epidemiology and clinical treatment trials. Our work is highly interdisciplinary, and based on collaboration between experts in clinical medicine, physiotherapy, mathematics, genetics and molecular biology.

Ongoing projects

- Norwegian Centre for Headache Research – NorHEAD (www.ntnu.edu/norhead)
- HUNT All-In Neuropsychiatry
- Decipher mechanisms and improve the treatment of chronic pain through large-scale genetic analysis (DecipherPain)
- Headache biomarkers
- Genetic aspects of chronic low back pain and its comorbidities
- Familial Hemiplegic Migraine in Norway
- Translating molecular insights into improved treatment for headache disorders (GenTranslate)

Most important national and international collaborators

National

- UiO and OUH: Dept of Clinical Neurophysiology; Kristian Bernhard Nilsen, Norw. Center for Violence and Traumatic Stress Studies; Prof. Grete Dyb
- NTNU and St. Olav's Hospital: NorHEAD: Erling A Tronvik; HUNT

International

- Leiden University Medical Center, Dpt's of Human Genetics and Neurology, the Netherlands; Prof. Arn van den Maagdenberg, Gisela Terwindt
- Karolinska Institute, Dept. of Neuroscience, Sweden; Prof. Andrea Belin
- University of Michigan, Dept. of Computational Medicine, USA, Prof. Cristen Willer





- center for molecular and clinical epidemiology: Prof. Bjørn Olav Åsvold
- UiB, Bergen: Marte Helene Bjørk
- Ahus: Espen Kristoffersen, Kjersti Vetvik
- Norwegian Institute of Public Health: Prof. Christopher Nielsen
- University Hospital of North Norway: Dr. Linn Steffensen

- Broad Institute of MIT and Harvard, the Stanley Center, USA; Prof Aarno Palotie, Prof Karestan Koenen
- King's College London, Institute of Neurology, UK; Prof Henry Houlden, Manjit Matharu
- Institute for Molecular Medicine Finland; Prof. Maija Wessman, Matti Pirinen
- Queensland University of Technology, Australia; Prof. Dale Nyholt
- Danish Headache Center, Denmark; Thomas Folkman Hansen
- Vall d'Hebron University Hospital and Quirón Hospital, Dept of Neurology, Spain; Dr. Patricia Pozo Rosich
- Mc Gill University, Canada; Prof. Luda Diatchenko
- Université de Bourdeaux, France; Prof. Stephanie Debette

Consortium participations

- CCG - International Consortium for Cluster Headache Genetics (www.clusterheadachegenetics.org)
- IHGC - International Headache Genetics Consortium (www.headachegenetics.org)
- GO - Genetics of Osteoarthritis (www.genetics-osteoarthritis.com)
- GSCAN - GWAS & Sequencing Consortium of Alcohol and Nicotine use (gscan.sph.umich.edu)
- CHARGE consortium (www.chargeconsortium.com)
- SSGAC - Social Science Genetic Association Consortium (www.thessgac.org)
- PGC - Psychiatric Genetics Consortium; PTSD Workgroup (www.med.unc.edu/pgc)
- PGC - Psychiatric Genetics Consortium; Alzheimer's disease Workgroup (www.med.unc.edu/pgc)
- PGC - Psychiatric Genetics Consortium; Bipolar Disorder Workgroup (www.med.unc.edu/pgc)
- PGC - Psychiatric Genetics Consortium; OCD & Tourette Workgroup (www.med.unc.edu/pgc)
- PGC - Psychiatric Genetics Consortium; ADHD Workgroup (www.med.unc.edu/pgc)
- PGC - Psychiatric Genetics Consortium; Major depressive disorder Workgroup (www.med.unc.edu/pgc)
- PGC - Psychiatric Genetics Consortium; Anxiety Workgroup (www.med.unc.edu/pgc)
- PGC - Psychiatric Genetics Consortium; Alzheimer's Disease Workgroup (www.med.unc.edu/pgc)
- PGC - Psychiatric Genetics Consortium; ADHD Workgroup (www.med.unc.edu/pgc)

Ongoing clinical trials

- EpisodicStatinMic. A multicentre, triple blind, placebo controlled, parallel group study of atorvastatin in episodic migraine. EudraCT Number 2022-502176-23-01. Role: Local PI. Sponsor institution: St. Olav's Hospital, Trondheim, Norway
- Chronic StatinMic. A multicentre, triple blind, placebo controlled, parallel group study of atorvastatin in chronic migraine. EudraCT Number 2022-502177-42-02. Role: Local PI. Sponsor institution: St. Olav's Hospital, Trondheim, Norway





- Nurse intervention Trial. Follow-up from headache nurse: An open randomized. REK #2023/554940. Role: Local PI. Sponsor institution: St. Olav's Hospital, Trondheim, Norway
- Interventional, randomized, double-blind, parallel-group, placebo-controlled study of add-on eptinezumab treatment to brief educational intervention for the preventive treatment of migraine in patients with dual diagnosis of migraine and medication overuse headache (RESOLUTION). EudraCT Number 2021-003049-40. Role: Local PI. Sponsor institution: H. Lundbeck A/S
- CandMig 3 Study - Candesartan for migraine prevention: A multicentre, binational, triple blind, placebo controlled, parallel group study of two doses of candesartan (8 and 16 mg). EudraCT Number 2019-003386-18. Role: Local PI. Sponsor institution: St. Olav's Hospital, Trondheim
- MiBlock Study - Botulinum toxin type A blockade of the sphenopalatine ganglion in treatment-refractory chronic migraine: A randomized, placebo-controlled, triple-blind (blinded statistician), multicentre, parallel group proof-of-concept, phase 3 study. EudraCT Number 2018-004053-24. Role: Sub-PI. Sponsor institution: St. Olav's Hospital and NTNU, Trondheim
- AIM Study - Efficacy of antibiotic treatment in patients with chronic low back pain and Modic changes: A double blind, randomised, placebo controlled, multicentre trial Role: Sub-PI. Sponsor institution: OUH

Funding

- South-Eastern Norway Regional Health Authority
- The Research Council of Norway
- OUH

Scientific production of the research group in 2023

Peer reviewed original research articles: 6

Selected publications:

Winsvold BS, Harder AVE, Ran C, Chalmer MA, Dalmasso MC, Ferkingstad E, Tripathi KP, Bacchelli E, Børte S et.al.

"Cluster headache genome-wide association study and meta-analysis identifies eight loci and implicates smoking as causal risk factor"

Annals of Neurology 2023

Revdal E, Kolstad BP, Winsvold BS, Selmer KK, Morken G, Brodtkorb E.

"Psychiatric comorbidity in relation to clinical characteristics of epilepsy: A retrospective observational study"

Seizure 2023

Ao X, Parisien M, Zidan M, Grant AV, Martinsen AE, Winsvold BS, Diatchenko L

"Rare variant analyses in large-scale cohorts identified SLC13A1 associated with chronic pain"

Pain 2023





Neurogenetics research group



Group Leader

Kaja Selmer, MD/PhD, Scientist, OUH (k.k.selmer@medisin.uio.no)

Group members

- Kristina Gervin, Senior scientist, OUH
- Fridny Heimisdottir, PhD fellow, OUH
- Mari Spildrejorde, Post-doc, OUH
- Inger-Lise Mero, MD, PhD, OUH
- Mathilde Minet Kinge-Rasmussen, MD, PhD fellow, OUH
- Siri Lynne Rydning, MD, PhD, OUH
- Sjur Prestsæter, MD, PhD fellow, OUH
- Jeanette Koht, MD, PhD, OUH
- Ying Sheng, PhD, Bioinformatician, OUH
- Chantal Tallaksen, MD, Prof. Emeritus, UiO/OUH
- Eirik Sandvik Gulbrandsen, PhD fellow, OUH

Associated group members

- Emilie Willoch Olstad, PhD fellow, UiO
- Iselin Wedding, MD, PhD, OUH
- Magnus D. Vigeland, Mathematician, OUH
- Ida Stenshorne, MD, PhD, OUH
- Magnhild Kverneland, PhD, OUH

Research profile and aims

The aim of the group is to identify and characterize the underlying causes, biomarkers and predictors of neurological disease, with a focus on epilepsy, movement disorders, and musculoskeletal disease and pain. With the access to detailed clinical and molecular data from clinical trials and large population databases, we aim to translate our results into knowledge enabling personalized treatment for the patients.

Ongoing projects

- TeraEpi: Teratogenicity of anti-seizure medication: the roles of epigenetics and folic acid supplements
- Epilepsy in Children: The Impact of the Gut Microbiota and Epigenetics in Successful Dietary Treatment
- FORCE: Focal Refractory Childhood Epilepsy - A study of surgical treatment in Norway – aetiology and prognostic factors
- Pharmacokinetic interactions between ketogenic diet and anti-epileptic drugs in children
- Dietary treatment of adult patients with epilepsy
- BIOJUME: Biology of Juvenile Myoclonic Epilepsy. Genetics and epigenetics of juvenile myoclonic epilepsy





- Clinical and molecular characterization of hereditary ataxia and hereditary spastic paraplegia
- BRUFUS: User involvement in research of rare disorders
- Deciphering molecular causes of pain: A study of neuropathic pain (part of REMEDY and DOLORISK)
- epiNOR-MS: Identification of epigenetic biomarkers for treatment response in MS
- UiO:RealArt: Real world – artificial worlds: Improving causal inference in perinatal pharmaco-epidemiology using machine learning approaches on real-world and artificial data
- NorEpiNet: Nordic network for personalized treatment of epilepsy
- ReMeDy: Center for Rheumatic and Musculoskeletal Diseases

Most important national and international collaborators

National

- Bergen epilepsy research group; BERG
- Complex epilepsy research group
- National Centre for Rare Epilepsy-Related Disorders
- Epilepsi research group in Oslo; ERGO
- Dept. of Microbiology, OUH/UiO
- NervOUS1, neuropediatric research group
- National Advisory Unit on Rare Disorders, OUH
- Patient organizations: Norsk epilepsiforbund; Norsk forening for arvelig spastisk parapares og ataksi; Rådet for muskelskjeletthelse
- Diakonhjemmet Hospital

International

- Bristol University, UK
- Filadelfia epilepsy hospital, Denmark
- University College London, UCL, UK
- The BIOJUME consortium
- The SPATAK network

Funding

- The Research Council of Norway
- Novo Nordic Foundation
- DAM Foundation
- The National Advisory Unit on Rare Disorders
- Barnestifelsen, OUH
- Norsk Epilepsiselskap
- Epilepsiforbundet
- South-Eastern Norway Regional Health Authority
- NordForsk

Scientific production of the research group in 2023

Peer reviewed original research articles: 20





Selected publications:

Spildrejorde M, Samara A, Sharma A, Leithaug M, Falck M, Modafferi S, Sundaram AYM, Acharya G, Nordeng H, Eskeland R, **Gervin K**, Lyle R.

“Multi-omics approach reveals dysregulated genes during hESCs neuronal differentiation exposure to paracetamol”

iScience. 2023 Aug 28;26(10):107755. doi:
10.1016/j.isci.2023.107755. PMID: 37731623; PMCID: PMC10507163.

Olstad EW, Nordeng HME, Sandve GK, Lyle R, **Gervin K**.

“Effects of prenatal exposure to (es)citalopram and maternal depression during pregnancy on DNA methylation and child neurodevelopment”

Transl Psychiatry. 2023 May 5;13(1):149.
doi: 10.1038/s41398-023-02441-2. PMID: 37147306; PMCID: PMC10163054.

Kverneland M, Nakken KO, Hofoss D, Skogan AH, Iversen PO, **Selmer KK**, Lossius MI.

“Health-related quality of life in adults with drug-resistant focal epilepsy treated with modified Atkins diet in a randomized clinical trial”

Epilepsia 2023 May;64(5):e69-e74. doi: 10.1111/epi.17585. Epub 2023 Mar 29. PMID:
36923995





Research group for applied neurophysiology



Group Leader

Kristian Bernhard Nilsen, MD/PhD, Consultant Clinical Neurophysiologist, OUH (kristian.bernhard.nilsen@ous-hf.no)

Group members

- Inge Petter Kleggetveit, MD/Postdoctoral fellow, OUH
- Daniel Gregor Schulze, MD/PhD fellow, OUH
- Line Bedos Ulvin, MD/PhD fellow, OUH
- Hoang Oanh Pauline Do, MD/PhD student, OUH
- Øystein Dunker, Msc/PhD fellow, OUH
- Tomasz Szymon Szczepanski, MD/PhD student, OUH
- Tarun Arora, Phd fellow, OUH
- Sara Maria Allen, Msc, OUH
- Jørn Klepp Thorgersen, Mcs, OUH
- Bettina Kjøge Wilhelmsen, Mcs, OUH
- Christine Helseth, Mcs, OUH
- Elena Petriu, Msc, OUH
- John Anker Zwart, MD, professor in Neurology

Research profile and aims

Our ambition is to better patient care through increased understanding of the nervous system. We will take the lead within method development and application of new methods in clinical neurophysiology.

We are currently involved in both basic research, clinical trials and innovation projects at Department of Neurology and Department of Research and Innovation, both in the Neuroscience Clinic at OUH/UiO.

We write about neuroscience in our research blog - Nevroglint (in Norwegian)

Ongoing projects

-with group leader as PI

- The ENTRAPME project – Improved diagnostics for nerve entrapments using machine learning
National study, funding from HSØ. 2024–
- The DIGMINE project - Digital gold mining in historical neurophysiological data
National quality study 2020–
- Neurological home hospital
Innovation study funded by South-Eastern Health Authority. 2022 – 2024





- Exploring the Genetics of NEUropathic Pain – The GeNeup study
National study, funding from NRC. 2017-
[Norwegian version](#)
[English version](#)
- Motor neurons – can they be counted?
Clinical study on a new biomarker for ALS 2019-
- Tak-861 clinical studies

Most important national and international collaborators

National

- Stavanger University Hospital;
Marie Bu Kvaløy
- Haukeland University Hospital, Bergen;
Tom Eichele
- NTNU/St. Olav's University Hospital,
Trondheim;
Petter Moe Omland
- University Hospital of North Norway;
Sissel Løseth
- Diakonhjemmet Hospital;
Hilde Berner Hammer, Ulf Sundin
- The National Institute of Occupational
Health in Norway; STAMI;
Dagfinn Matre

International

- University of Oxford, UK;
David Bennett
- Aarhus University Hospital, Denmark;
Hatice Tankisi
- David Geffen School of Medicine at UCLA - Los
Angeles, USA;
Joe Jabre
- Leiden University Medical Center;
Martijn Tannemaat

Funding

- South-Eastern Norway Regional Health Authority
- The Research Council of Norway
- The Norwegian Childhood Cancer Society
- The Norwegian Medical Association
- Kvanes legat

Scientific production of the research group in 2023

Peer reviewed original research articles: 8





Selected publications:

Dunker Ø, Uglem M, Bu Kvaløy M, Løseth S, Hjelland IE, Allen SM, Dehli Vigeland M, Kleggetveit IP, Sand T, Nilsen KB (2023)

"Diagnostic accuracy of the 5.07 monofilament test for diabetes polyneuropathy: influence of age, sex, neuropathic pain and neuropathy severity"

BMJ Open Diabetes Res Care, 11 (6)

DOI [10.1136/bmjdrc-2023-003545](https://doi.org/10.1136/bmjdrc-2023-003545), PubMed [37989346](https://pubmed.ncbi.nlm.nih.gov/37989346/)

Sørensen DM, Bostock H, Abrahao A, Alaamel A, Alaydin HC, Ballegaard M, Boran E, Cengiz B, de Carvalho M, Dunker Ø, Fuglsang-Frederiksen A, Graffe CC, Jones KE, Kallio M, Kalra S, Krarup C, Krøigård T, Liguori R, Lupescu T, Maitland S, Matamala JM, Moldovan M, Moreno-Roco J, Nilsen KB, Phung L et al. (2023)

"Estimating motor unit numbers from a CMAP scan: Repeatability study on three muscles at 15 centres"

Clin Neurophysiol, 151, 92-99

DOI [10.1016/j.clinph.2023.04.008](https://doi.org/10.1016/j.clinph.2023.04.008), PubMed [37236129](https://pubmed.ncbi.nlm.nih.gov/37236129/)

Tveit J, Aurlien H, Plis S, Calhoun VD, Tatum WO, Schomer DL, Arntsen V, Cox F, Fahoum F, Gallentine WB, Gardella E, Hahn CD, Husain AM, Kessler S, Kural MA, Nascimento FA, Tankisi H, Ulvin LB, Wennberg R, Beniczky S.

"Automated Interpretation of Clinical Electroencephalograms Using Artificial Intelligence"

JAMA Neurol. 2023 Aug 1;80(8):805-812. doi: 10.1001/jamaneurol.2023.1645. PMID: 37338864 Free PMC article





Department of Neurohabilitation

The Department of Neurohabilitaion with multidisciplinary staff, including consultants in neurology and psychiatry, psychologists with specialities in clinical neuropsychology and habilitation psychology, physiotherapists, nutritions and case workers with various professional backgrounds.

The department provides care to a wide variety of patient groups with complex disabilities, including intellectual disabilities and other aquired and congenital disorders, also including rare conditions, genetical conditions and neurological conditions.

The Department of Neurohabilitaion is headed by Lotta Fladby Tholander.





Intellectual disability and neurorehabilitation



Group Leader

Bjørnar Hassel, Professor, Dept. of Neurorehabilitation, OUH
(bjornar.hassel@ous-hf.no) and UiO (bjornar.hassel@medisin.uio.no)

Group Members

- Sigrun Hope, MD, PhD, OUH
- Anne Katrin T. Holmøy, MD, OUH
- Kathrine Haggag, MD, OUH
- Jutta Rummel, MD, OUH
- Alma Sikiric, MD, OUH
- Gøril Svae, OUH
- Daniel Dahlberg, MD, OUH
- Marleen van Walsem, PhD, OUH
- Emilie Kildal, Cand psychol, UiO

Research profile and aims

The aim of the Intellectual disability and neurorehabilitation research group is 1) to conduct research that will lead to improvement of the quality of life of persons with developmental disabilities, 2) to investigate mechanisms behind brain dysfunction and damage that leads to developmental disability.

In collaboration with the municipality of Oslo, various departments at OUH and OsloMet, we investigate the use of sensors for autonomic responses as a means of communication for developmentally disabled persons who are unable to express their needs.

To investigate mechanisms that underlie some forms of developmental disability we use clinical and preclinical approaches to elucidate mechanisms of toxicity of certain metabolites and microbes.

Ongoing projects

- Wearable sensors for autonomic responses as a means of communication for persons with developmental disability who lack the ability to express themselves
- Mechanisms of seizure generation and cell death during brain abscess formation, a preventable cause of developmental disability
- Mechanisms of cell death and seizure generation during formation of cystic brain tumors
- The effects on brain cells of propionic acid, a metabolite that causes cerebral dysfunction in an inborn error of metabolism
- The metabolism of glyceraldehyde, a cause of neurodegeneration through formation of advanced glycation end products
- Barriers to proper handling of persons with intellectual disability and harmful sexual behavior





Most important national and international collaborators

National

- Emilie Kildal, Terje Nærland, Ole Andreassen, KG Jebsens Center, UiO/OUH
- Cecilie Morland, OsloMet/Inst. of Pharmacy, UiO
- Mona-Elisabeth Revheim, Ebba Gløersen Müller, James Patrick Connelly, Div. of Radiology and Nuclear Medicine, OUH
- Bente Halvorsen, Research Institute of Internal Medicine, OUH
- Oslo Municipality/burroughs of Nordstrand, Østensjø and Vestre Aker
- Bærum municipality/Emma Hjorts Hjem
- Pål Gunnar Larsson, Ketil Olsen, Dept. of Neurosurgery, OUH
- Erik Taubøll, Dept. of Neurology, UiO
- Leiv Otto Watne, Dept. of Geriatrics, Ahus
- Espen Mariussen and Øyvind Voie, Norwegian Defence Research Establishment, Kjeller
- Frode Rise, Inst. of Chemistry, UiO
- Farrukh Chaudry, Niels Christian Danbolt, Dept. of Anatomy, UiO

International

- Raymond Dingledine, Emory University, Atlanta, GA, USA

Scientific production of the research group in 2023

Peer reviewed original research articles: 3

Selected publications:

Dahlberg D, Holm S, Sagen EML, Michelsen AE, Stensland M, de Souza GA, Müller EG, Connelly JP, Revheim ME, Halvorsen B, Hassel B.

"Bacterial Brain Abscesses Expand Despite Effective Antibiotic Treatment: A Process Powered by Osmosis Due to Neutrophil Cell Death"

Neurosurgery. 2023;94(5):1079–87. doi: 10.1227/neu.0000000000002792.

Watne LO, Pollmann CT, Neerland BE, Quist-Paulsen E, Halaas NB, Idland AV, Hassel B, Henjum K, Knapskog AB, Frihagen F, Raeder J, Godø A, Ueland PM, McCann A, Figved W, Selbæk G, Zetterberg H, Fang EF, Myrstad M, Giil LM.

"Cerebrospinal fluid quinolinic acid is strongly associated with delirium and mortality in hip-fracture patients"

J Clin Invest. 2023;133(2):e163472. doi: 10.1172/JCI163472.

Svae GB, Hassel B, Søndenaa E.

"People with intellectual disabilities and harmful sexual behaviour: Professionals' views on the barriers to prevent harm"

J Appl Res Intellect Disabil. 2023;36(1):176-185. doi: 10.1111/jar.13048.





Funding

- The Research Council of Norway
- Rebergs legat





Sunnaas Rehabilitation Hospital

The hospital's full continuum of care focuses on community re-entry, which for many people means returning to home, work or a supported, community living environment. The hospital also holds national responsibilities for rare congenital disorders and locked-in syndrome.

Our areas of expertise includes spinal cord injuries, severe multitrauma, traumatic brain injuries, stroke, cognitive challenges, pain, severe burn injuries, neurological illnesses and congenital disorders.





Specialized medical rehabilitation



Group Leader

Frank Becker, MD/PhD, Associate Professor, Dept. of Physical Medicine and Rehabilitation, UiO/Sunnaas Rehabilitation Hospital (frank.becker@sunnaas.no)

Group Members

- Anne Catrine Trægde Martinsen, Professor, Director of Research, Sunnaas/OsloMet
- Hege Prag Øra, MD/PhD, Sunnaas/UiO
- Kristin Knudsen-Baas, MD/PhD, Sunnaas
- Claudia Nyberg, MD/PhD, Sunnaas
- Maria Ryssdal Kraby, MD/PhD, Sunnaas
- Svein Otto Fredwall, MD/PhD, Sunnaas
- Ariane Kwiet, MD/PhD, Sunnaas
- Lena Lande Wekre, MD/PhD, Sunnaas
- Marianne Løvstad, PSYCH/PhD, Professor, Sunnaas/UiO
- Per Ola Rike, PSYCH/PhD, Sunnaas
- Sveinung Tornås, PSYCH/PhD, Sunnaas
- Solveig Hauger, PSYCH/PhD, Sunnaas/UiO
- Nina Marit Rohrer-Baumgartner, PSYCH/PhD, Sunnaas
- Daniel Løke, PSYCH/PhD, Sunnaas
- Vegard Strøm, Cand. Scient/PhD, Sunnaas/Norwegian School of Sport Sciences
- Kirsti Skavberg Roaldsen, PT/PhD, Sunnaas / Karolinska Institute
- Charlotta Hamre, PT/PhD, Sunnaas
- Arve I. Opheim, PT/PhD, Sunnaas/Region Västra Götaland
- Vivien Jørgensen, PT/PhD, Sunnaas
- Ellen Høyer, PT/PhD, Sunnaas
- Anne Lannem, PT/PhD, Sunnaas
- Matthijs Wouda, PT/PhD, Sunnaas/OsloMet
- Linda Rennie, PT/PhD, Sunnaas/OsloMet
- Edel Jannecke Svendsen, RN/PhD, Sunnaas
- Ellen Berg, Cand Scient/PhD, Sunnaas/OsloMet
- Gry Velvin, SW/PhD, Sunnaas

Guest professors:

- Fin Biering-Sørensen, MD/PhD, Professor, Copenhagen University
- Katharina Sunnerhagen, MD/PhD, Professor, Gothenburg University
- Jennie Ponsford, PSYCH/PhD, Professor, Monash University, Melbourne
- Claire Glenton, Dr. philos, Norwegian Institute of Public Health





PhD fellows:

- Medical Doctor: Ingebjørg Irgens, Erlend Solberg Dørrum, Kristine Marie M. Vege, Jelena Simic, Helle Walseth Nilsen
- Psychologist: Knut Kolskår, Dani Beck, Ingvil Laberg Holthe, Anja Schanke, Martin Matre, Line Sophie Eide
- Nurse: Anne Geard
- Physiotherapist: Wiebke Höfers, Pia Wedege, Ann Marie Hestetun-Mandrup, Eivind Lundgard
- Social Worker: Jannike Vikan
- Speech and Language Therapist: Maribeth C. Rivelsrud, Silje Merete Hansen
- Occupational Therapist: Anne-Marthe Sanders, Truls Johansen
- Dietician: Hanne Bjørg Slettafjell
- Movement scientist: Sandra Linnea Klund-Hansen

Research profile and aims

The overall research aim for our group is to improve everyday living of people with physical and/or cognitive impairments. Within the setting of specialized rehabilitation, especially neurorehabilitation, we are interested in all aspects of body functions, activities and participation that injury or disease may affect (cf. ICF – WHO's International Classification of Functioning, Disability and Health). Our research activities comprise both subacute and chronic stages, and are organized in five thematic research groups:

- Acquired Brain injuries
- Spinal cord injuries
- Movement dysfunctions
- Rare disorders
- Aphasia and register data

Ongoing projects

A large number of studies are ongoing, mainly within the following areas:

- Specialized rehabilitation interventions for patients with acquired neurological injuries, such as stroke, spinal cord injury or traumatic brain injury
- Rehabilitation technology, e.g. gaming, virtual reality, robot-assisted motor training
- Rehabilitation of acquired injuries in children and adolescents
- Rare disorders as e.g. Marfan's syndrome, achondroplasia





Most important national and international collaborators

National

- Oslo University Hospital
- OsloMet
- Norwegian Sport High School
- Haukeland University Hospital
- St. Olav Hospital
- University Hospital of North Norway
- Beitostølen Health Sport Center
- Hospitals in the South-Eastern Norway Health Region

International

- Karolinska Institute, Stockholm, Sweden
- Gothenburg University, Sweden
- Copenhagen University, Denmark
- Monash University, Melbourne, Australia
- China Rehabilitation and Research Center, China
- Rusk Institute of Rehabilitation, NY, USA
- Polyclinic no2, Petrozavodsk, Karelia, Russia
- Sheba Medical Center, Tel Aviv, Israel
- Bethlehem Arab Society for Rehabilitation, Palestine
- El Wafa Hospital, Gaza, Palestine
- Sahlgrenska University Hospital, Högsbo, Sweden
- Bayi 81 Rehabilitation Center, Sichuan, China
- Schweizer Paraplegiker-Forschung AG, Switzerland

Funding

Main sources:

- The Norwegian Research Council
- South-Eastern Norway Regional Health Authorities
- DAM – Norwegian ExtraFoundation for Health and Rehabilitation
- Sunnaas Rehabilitation Hospital
- Birgit og Rolf Sunnaas Minnefond

Scientific production of the research group in 2023

Dissertations:

"Biopsychosocial Mechanisms in Fatigue – Exploration of Factors Associated with the Occurrence and Maintenance of Fatigue in the General Population and Patients with Traumatic Brain Injury"
Daniel Løke

"Stroke and cognitive control: functional MRI, lesion characteristics, and treatment response"
Knut K. Kolskår

"Oropharyngeal dysphagia in adults"
Maribeth C. Rivilsrud

"Videoconferencing for Follow-Up of Pressure Injury. Period Prevalence, Risks, Treatment and Financial Consequences"
Ingebjørg Irgens





Peer reviewed original research articles: 55

Selected publications:

"Demographic, Medical, and Clinical Characteristics of a Population-Based Sample of Patients With Long-lasting Locked-In Syndrome"

Nilsen HW, Martinsen ACT, Johansen I, Kirkevold M, Sunnerhagen KS, Becker F.
Neurology. 2023 Sep 5;101(10):e1025-e1035.

"Rehabilitation of Social Communication Skills in Patients With Acquired Brain Injury With Intensive and Standard Group Interactive Structured Treatment: A Randomized Controlled Trial"

Ingebretsen SMH, Kirmess M, Småstuen MC, Hawley L, Newman J, Stubberud J.
Arch Phys Med Rehabil. 2023 Jul;104(7):1016-1025.

"Children's, parents', and teachers' experiences of the feasibility of a telerehabilitation intervention for children with acquired brain injury in the chronic phase - a qualitative study of acceptability and participation in the Child In Context Intervention (CICI)"

Svendsen EJ, Killi EM, Rohrer-Baumgartner N, Holthe IL, Sandhaug M, Borgen IMH, Wade SL, Hauger SL, Løvstad M, Bragstad LK.
BMC Health Serv Res. 2023 Jun 8;23(1):603.





Publication list NVR research groups 2023

Includes ordinary journal articles and reviews only

Abdelhak A, Barba L, Romoli M, Benkert P, Conversi F, D'Anna L, Masvekar RR, Bielekova B, Prudencio M, Petruccielli L, Meschia JF, Erben Y, Furlan R, De Lorenzo R, Mandelli A, Sutter R, Hert L, Epple V, Marastoni D, Sellner J, Steinacker P, Aamodt AH, Heggelund L, Dyrhol-Riise AM, Virhammar J et al. (2023) Prognostic performance of blood neurofilament light chain protein in hospitalized COVID-19 patients without major central nervous system manifestations: an individual participant data meta-analysis J Neurol, 270 (7), 3315-3328
DOI [10.1007/s00415-023-11768-1](https://doi.org/10.1007/s00415-023-11768-1), PubMed [37184659](https://pubmed.ncbi.nlm.nih.gov/37184659/)

Aden P, Skarbø AB, Wallace S, Ørstavik K, Rasmussen M (2023) Cognitive function, behaviour and quality of life in children with myotonic dystrophy type 1 in South - Eastern Norway Eur J Paediatr Neurol, 45, 1-6
DOI [10.1016/j.ejpn.2023.05.004](https://doi.org/10.1016/j.ejpn.2023.05.004), PubMed [37209486](https://pubmed.ncbi.nlm.nih.gov/37209486/)

Alvsåker K, Hanoa R, Olasveengen TM (2023) Selecting patients for early interdisciplinary rehabilitation during neurointensive care after moderate to severe traumatic brain injury Acta Anaesthesiol Scand, 67 (8), 1069-1078
DOI [10.1111/aas.14285](https://doi.org/10.1111/aas.14285), PubMed [37259274](https://pubmed.ncbi.nlm.nih.gov/37259274/)

Andersen MS, Leikfoss IS, Brorson IS, Cappelletti C, Bettencourt C, Toft M, Pihlstrøm L (2023) Epigenome-wide association study of peripheral immune cell populations in Parkinson's disease NPJ Parkinsons Dis, 9 (1), 149
DOI [10.1038/s41531-023-00594-x](https://doi.org/10.1038/s41531-023-00594-x), PubMed [37903812](https://pubmed.ncbi.nlm.nih.gov/37903812/)

Andersen S, Western E, Sorteberg W, Sorteberg A (2023) The impact of pre-ictal statin use on vasospasm and outcome in aneurysmal subarachnoid hemorrhage Acta Neurochir (Wien), 165 (11), 3325-3338
DOI [10.1007/s00701-023-05812-2](https://doi.org/10.1007/s00701-023-05812-2), PubMed [37792050](https://pubmed.ncbi.nlm.nih.gov/37792050/)

Andorra M, Freire A, Zubizarreta I, de Rosbo NK, Bos SD, Rinas M, Høgestøl EA, de Rodez Benavent SA, Berge T, Brune-Ingebretse S, Ivaldi F, Cellerino M, Pardini M, Vila G, Pulido-Valdeolivas I, Martinez-Lapiscina EH, Llufriu S, Saiz A, Blanco Y, Martinez-Heras E, Solana E, Bäcker-Koduah P, Behrens J, Kuchling J, Asseyer S et al. (2023) Predicting disease severity in multiple sclerosis using multimodal data and machine learning J Neurol, 271 (3), 1133-1149
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