



**NORMENT**  
Norwegian Centre for  
Mental Disorders Research

# NORMENT Annual Report 2020



UiO University of Oslo



UNIVERSITY OF BERGEN



Oslo  
University Hospital



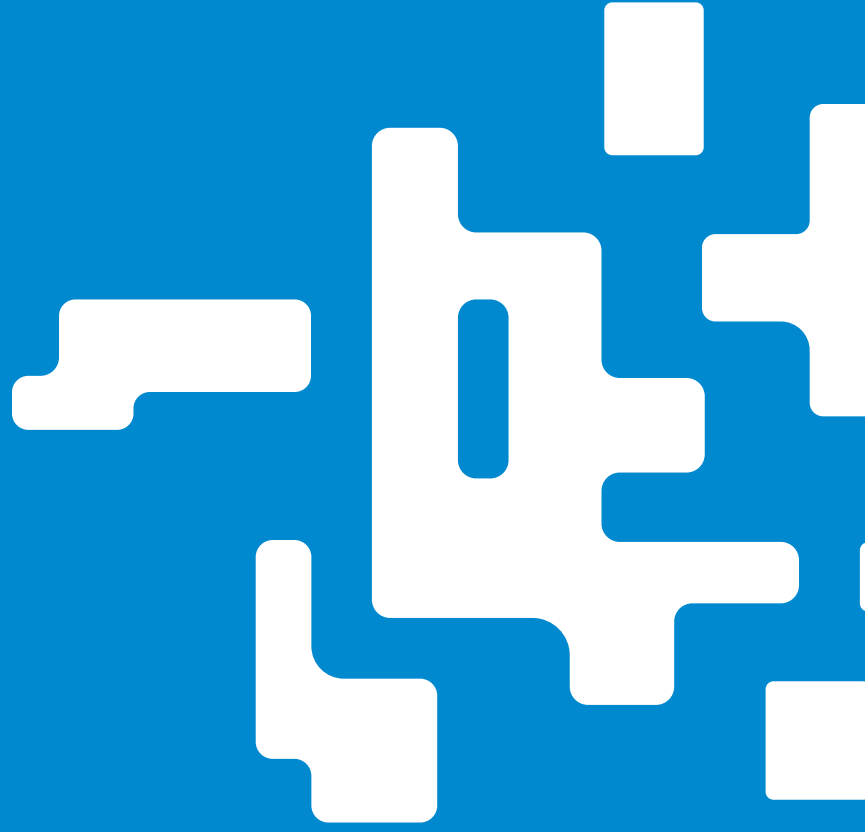
Haukeland University Hospital



Norwegian  
Centre of  
Excellence

The Research Council of Norway





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## Leader's Comments



The year 2020 has been special for NORMENT because of the Covid-19 pandemic. Both our work and personal life were heavily affected. The Centre 'went digital' with home office and Zoom meetings, and inclusion of participants and wet lab work closed for extended periods. Despite our mitigation measures, the situation has been challenging for many people. I really hope we can get back to a more normal situation over the summer.

Nevertheless, our scientific activities of 2020 have been a success. We have further improved the quality and number of publications, including several with high impact. This shows how the NORMENT team is able to take advantage of our unique opportunities, leveraging the infrastructure, expertise and talented co-workers. Further illustration of the scientific quality comes from the awards in 2020. I was very honored to receive the University of Oslo Research Award. Although this award is given to a single person, it is a tribute to the teamwork and a strong contribution from many researchers across NORMENT.

In addition, we continued our success in obtaining external research funding, with several grants to NORMENT researchers, including Young Talent Grants to Torgeir Moberget and Torbjørn Elvsåshagen. In addition to grants from the Research Council of Norway and Regional Health Authorities, we also received a new EU Grant from the Horizon 2020 program, coordinated by NORMENT. This funding will secure our level of activity in the coming years.

The NORMENT dissemination activities have also increased in 2020. We have improved our social media presentations on Twitter and Facebook, and we were present at the Norwegian Research Festival, "Forskningdagene". This included participation at a photo exhibition in the city of Oslo and hosting the webinar "Is brain research the key to understand mental illness?". We also launched our newsletter, and collaborated with the Norwegian Bipolar Association in two seminars for lay people, which were well attended.

The Centre of Excellence grant scheme has a strong focus on "synergy" that can be reached by working together. Now in the second half of the funding period there are several examples of research achievements at the Centre that would not have been possible without a true interdisciplinary research attitude. In fact, most of our current projects depend on input from multiple scientific disciplines. Collaborating across disciplines may be quite demanding, both in terms of communication and appreciation of input from other researchers with different education, skills and knowledge. Creating this atmosphere is a major achievement.

Similarly, we have seen how international researcher exchange, collaboration and networks really increase the quality of our work. As shown in the report, we have a highly international team, strong scientific collaboration with researchers abroad, and an increasing number of grants obtained through international competition. Our international research agenda has been instrumental to the success of the Centre, and will help us to keep working with excellent research projects also after the funding period is over.

I would like to use the opportunity to thank the whole NORMENT team for their efforts in 2020, and especially how well they handled the pandemic situation and adapted to ever changing and unstable work conditions. It is a pleasure and privilege to be the Director of NORMENT with such outstanding colleagues. I look forward to a fruitful and collaborative year in 2021, which hopefully will include the end of the pandemic restrictions.

A handwritten signature in blue ink, reading "Ole A. Andreassen".

Ole A. Andreassen  
Centre Director

## Scientific Highlights 2020

Our research resulted in many exciting and important findings in 2020, of which several were published in prestigious scientific journals with NORMENT researchers as lead authors.

Erik Johnsen, Rune Kroken and co-authors reported the results from the BeSt InTro study, a large clinical trial on antipsychotic medication in schizophrenia-spectrum disorders. Comparing amisulpride, aripiprazole, and olanzapine, they found large differences in effectiveness of these medications, with amisulpride being most efficient substance in reducing general psychotic symptoms (*Lancet Psychiatry*).

Shahram Bahrami, Nils Eiel Steen and colleagues documented a genetic overlap between body mass index and major psychiatric disorders (*JAMA Psychiatry*). In bipolar disorder and depression most gene variants were associated with higher risk of overweight, while schizophrenia risk genes were linked to low weight.

Torbjørn Elvsåshagen, Shahram Bahrami and collaborators characterized the genetic architecture of human brainstem structures and their involvement in common brain disorders (*Nature Communications*). They found overlapping genes between brain stem size and various disorders including schizophrenia and depression, implicating a role of the brain stem in these disorders.

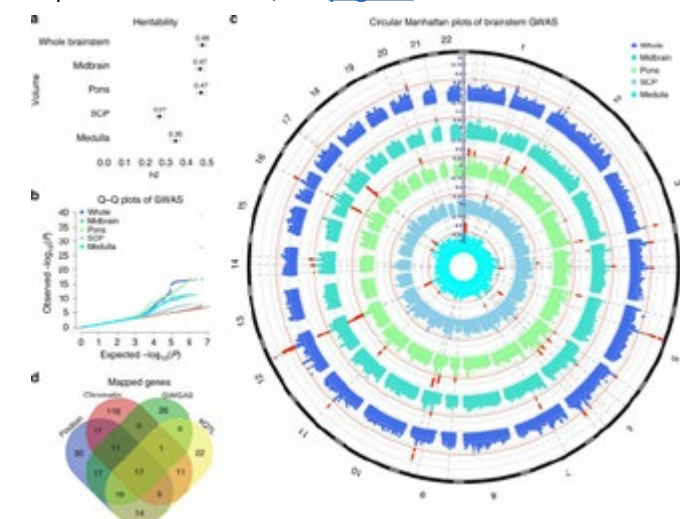
Together with collaborators in San Diego, Dennis van der Meer and Oleksandr Frei published imaging genetic data analyzed with a novel statistical tool ("MOSTest") developed at NORMENT, which is a potential opportunity for use in stratification and outcome prediction (*Nature Communications*).

Dag Alnæs and colleagues revealed associations between sociodemographic variables and brain structure, analyzing the ABCD cohort (PNAS). Tiril Gurholt had the leading role in a large neuroimaging study (ENIGMA) on adolescent early-onset psychosis. Similar brain alterations were found in adolescents as in adult psychosis, but with notably low intracranial volume, suggesting disrupted neurodevelopment in early-onset psychosis (*Human Brain Mapping*).

NORMENT researchers were also involved in a number of other international studies, including schizophrenia (Holleran et al., *American Journal of Psychiatry*), bipolar disorder (Ching et al., *Human Brain Mapping*), major depressive disorder (Han et al., *Molecular Psychiatry*), and somatic comorbidity of psychosis (Schwarz et al., *Molecular Psychiatry*).

We also identified important characteristics of psychotic disorders that may be useful for clinical outcome and prediction of illness course. These include adverse life events (Wortinger et al., Mørkved et al.), immune factors (Reponen et al., Akkouch et al.), brain neurochemistry (Hjelmervik et al.), clinical symptoms (Høegh et al., Widing et al., Hjell et al.), cognitive functions (Haatveit et al., Vaskinn et al.), physical activity (Jakobsen et al.), and sleep disturbances (Laskemoen et al.).

For a complete list of NORMENT publications in 2020, see [page 80](#)



Elvsåshagen and Bahrami et al., *Nature Communications*, 2020



## NORMENT and the Covid-19 pandemic

On March 12, Norway was locked down due to the corona virus outbreak. At short notice, we had to stop all patient-related research activities at NORMENT, close our experimental laboratories and start working from home. Meetings, supervision, and educational activities were moved to Zoom, and secure video solutions for patient interviews were established. Database personnel at the Centre facilitated access for our researchers to the University of Oslo service for sensitive data (TSD) to make everyone able to analyze data from home.

The first lockdown period was especially challenging both for individual researchers and for NORMENT as a Centre. Patient-directed projects and lab research, including clinical trials and stem cells, were particularly affected. Employees with children had reduced work hours due to kindergarten and school closures. PhD students and postdocs experienced delays and changes in project plans, particularly in studies dependent on new data collection. After summer, the patient-directed research and lab activities could gradually start up again, and we could carefully return to our offices. However, as the virus situation was continually changing during the fall semester, we had to adapt to new restrictions and limitations, and gradually realize that the pandemic would last much longer than originally expected. Many of our activities were further delayed, and we had to apply for project extensions from our funding agencies.

Despite this challenging and unpredictable situation, we have appreciated the advantage of being part of a bigger centre during this period. NORMENT made a digital shift before the pandemic (“eNORMENT”), which included the establishment of a common server for sensitive data (TSD), Wiki and intranet for sharing information, github and Slack for communication, as well as data collection through webforms and iPads. Much of the Centre’s research activities also work quite well on digital platforms, including meetings and contact with participants. In the final years of our Centre, we will use our experiences from the pandemic to strengthen our efforts to apply new and better communication technologies and more efficient research tools.

That being said, we realize that the long-lasting situation with home office, digital meetings, quarantine and infection control has been demanding for everyone at the Centre, and for new international employees in particular. We still do not know how long we need to cope with this situation. Perhaps the biggest challenge has been and still is the lack of social interaction with colleagues, which has reminded us about the importance of social life at work. We miss the chats by the coffee machine and informal discussions and exchange of ideas, which is important for people on a personal level, but is also key for high quality research and innovative activity. We have made efforts during the year to compensate for some of the lost social interaction, by organizing quiz and other social events on digital platforms, and by encouraging people to meet regularly on Zoom or for outdoor activities. However, this cannot fully replace the physical meeting places at work. We look forward to being back to our offices, hopefully in 2021!



Group photo of NORMENT employees, at the 2020 Annual Retreat.



Takk til NORMENT!



## Prizes and Awards



### The UiO Research Prize to Ole A. Andreassen

**Professor Ole A. Andreassen** received the [Research Prize](#) from the University of Oslo on September 2, 2020. The prize committee highlights Andreassen's development of new analytical methods for big data that have helped revealing the complex genetic architecture of mental health disorders. He has also contributed to enhance the status of mental health research in Norway, and to NORMENT becoming an important international contributor in this field of research.

The University of Oslo's Research Prize is awarded to a researcher that has excelled through outstanding research. The winner must be a national leader in their field, and – if the discipline exists in other countries – be recognized by leading overseas academic communities as well. The prize consists of a monetary award of NOK 250.000 and a diploma.

### Paper awards

**Researcher Tobias Kaufmann** received the Prize for outstanding paper of the spring 2020 from Oslo University Hospital, for the paper titled "Common brain disorders are associated with heritable patterns of apparent ageing of the brain". The paper was published in Nature Neuroscience in 2019 and involved contributions from several people from NORMENT.

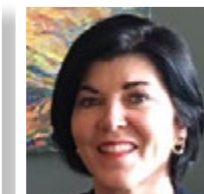


### Other awards

**Researcher Claudia Barth** and **postdoctoral research fellow Ann-Marie de Lange** were awarded the Young Investigator Award on the Women's Brain Health Conference on April 9, for their work on [pregnancy and sex hormone-related effects on brain age in women](#). They also received the Organization of the Study of Sex Differences (OSSD) Travel Award for this work.



**PhD candidate Petter Jakobsen** received the Best Poster Award on June 19, at the 22nd Annual Conference of the International Society for Bipolar Disorders, for the poster titled "Applying Machine Learning in Motor Activity Time Series of Depressed Bipolar and Unipolar Patients".



**PhD candidate Jonelle Villar** was awarded as a poster finalist on the 2020 Virtual World Congress of Psychiatry Genetics, in October for the poster titled "Antipsychotic drugs for psychosis: general and specific differential DNA methylation following treatment".



## About the Centre



The Norwegian Centre for Mental Disorders Research (NORMENT) is a research centre focusing on understanding the causes and mechanisms underlying severe mental illness. The goal is to better understand why some people develop psychotic symptoms (perceptual disturbances, hallucinations, delusions) and mood disturbances (depression, manic episodes). Ultimately, the hope is that by understanding more about how and why mental illness develops, we can contribute to increase the quality of prevention and treatment.

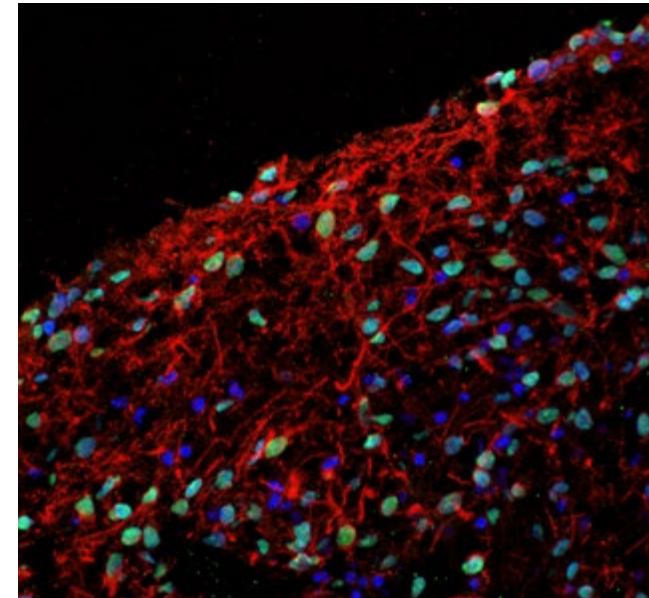
NORMENT was established as a Norwegian Centre of Excellence (CoE) in July 2013, with a 10-year CoE grant from the Research Council of Norway, as well as being funded by several other institutions.

The Centre is based on collaboration between the University of Oslo (host institution), the University of Bergen, Oslo University Hospital, and Haukeland University Hospital. The research on severe mental illness has a long history both in Oslo and Bergen and is based on many years of collaboration across the current NORMENT sites. In Oslo, the main research project preceding the Centre of Excellence was a network project called the "Thematically Organized Psychosis" (TOP) study, a thematic effort focused on psychotic disorders. The term "TOP" is still used about the main study protocol at the Centre, in which a large number of people have participated over the years.

In 2020, more than 200 people with various professional backgrounds such as Medicine, Psychology, Biology, Neuroscience, Mathematics, Statistics, Engineering, and Administration were involved at NORMENT, either as employees or affiliated to the Centre.

The research at NORMENT is being carried out in 15 research groups. The main research topics include Genetics (genetic susceptibility and heritability), Brain Imaging (brain structure and function), Outcome Prediction (estimation of illness course and outcome), and Clinical Intervention (test out new treatment). Most, if not all, research activities depend on a tight collaboration and efficient use of resources across different research groups and scientific disciplines. An important aim is to create a synergy effect where ideas, knowledge, and competence at the Centre as a whole become greater than its individual components. Using a "vertical synergy" approach, severe mental illnesses are studied across different levels and by combining different methods, to get the most complete picture of mechanisms involved in these complex disorders.

Most of NORMENT's research is made possible thanks to a large growing database where several thousand participants, both people with mental illness and healthy individuals, have generously volunteered to take part in extensive and time-consuming clinical assessments, neuropsychological tests, and brain imaging.



Inclusion of new participants into the studies represents a major activity at the Centre, also thanks to state-of-the-art facilities and an outstanding team of technical and administrative support personnel. NORMENT also has a focus on user involvement and has an active User Council and an employed User Representative that give valuable perspectives and input.

The last years, NORMENT has contributed to a series of important discoveries which have been published in recognized international scientific journals such as Science, Cell, Nature Genetics, JAMA Psychiatry, Molecular Psychiatry, Biological Psychiatry, and Schizophrenia Bulletin. NORMENT has so far:

- been involved in discoveries of new **gene variants** associated with severe mental illness, including large international studies reporting over 100 gene variants related to schizophrenia and 30 risk variants associated with bipolar disorder
- gained new knowledge about the **immune system** and related genes in mental illness
- developed novel and promising **statistical tools** to study mental disorders
- determined that complications before or during birth may affect **brain development** and play an important role in psychiatric illness
- identified **gene variants** related to specific regions and properties of the brain
- detected how **brain connections** evolve during development and are associated with mental health
- identified factors affecting illness progress and outcome, such as **childhood trauma** and its interaction with genes
- shown that **cannabis use** reduces the age of onset in bipolar disorder

In the years to come, the research at NORMENT will continue to follow up on new disease mechanisms, based on the discoveries of more risk genes for schizophrenia and bipolar disorder. In this regard, a promising new area of research is to use human stem cells developed from skin cells to investigate molecular and cellular mechanisms in mental illness. We will integrate this experimental work with clinical trials and interventions to follow up on our new prediction and clinical outcome findings and continue improving our approaches for analysing large amounts of data ("big data"). The Centre will maintain a leading role in the development and implementation of new digital tools, including apps and other new technology. Altogether, we aim to contribute substantially to a better understanding, care and treatment of severe mental disorders.

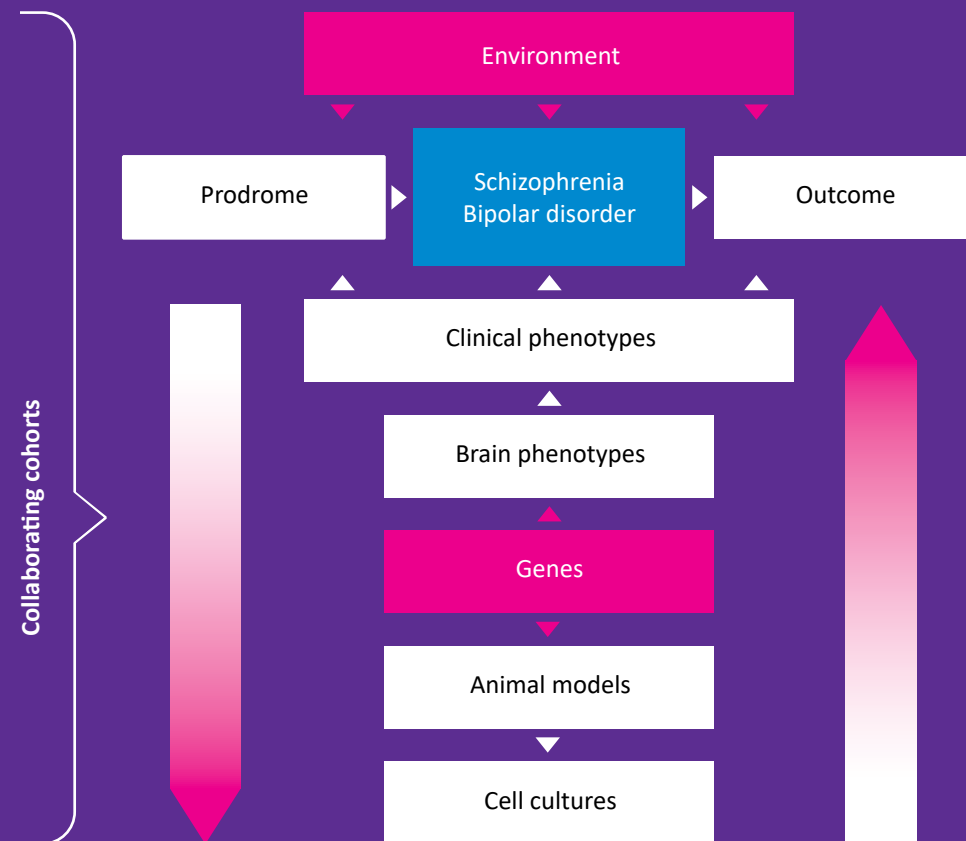
# Vision Statement

NORMENT's primary objective is to explore and reveal the underlying pathophysiology of psychotic disorders based on recent discoveries of genetic risk factors, develop tools for stratification and outcome prediction, and translate findings into clinical interventions.

The main research topics at the Centre are Genetics, Brain Imaging, Outcome Prediction, and Clinical Intervention, which are reflected in the following subgoals:

1. **Disclose the complete genetic architecture of psychotic disorders and determine their functional impact**
2. **Identify novel brain imaging phenotypes linking genes and clinical phenotypes in a longitudinal setting**
3. **Use genetic, environmental and clinical factors to predict disease progress and outcome**
4. **Translate pathophysiological discoveries into clinical and pharmacological interventions**

We benefit from the homogeneity of the Norwegian population (genetic background, health care system, registries) as the basis for collecting large samples of affected and unaffected people. These individuals are characterized with the same clinical, cognitive, biochemical and imaging protocols to identify new disease mechanisms which are then studied functionally in animal and cell culture models. The aim of this "vertical synergy" approach is to obtain different levels of understanding by bringing together transdisciplinary expertise and methods.



# Scientific Aims

## GENETICS: Disclose the complete genetic architecture of psychotic disorders and determine their functional impact

Large international genetic studies including NORMENT studies have generated evidence of novel risk genes. Emerging data show overlapping genetic architecture in bipolar disorder and schizophrenia, and involvement of many genes with small effects (polygenic architecture), but also rare variants and copy number variants with larger effects.

Still, the identified genetic variants explain only a small fraction of disease susceptibility. We have developed statistical models supporting that there is a large potential for gene discovery in bipolar disorder and schizophrenia, with relatively small increase in sample size.

### Aims:

- Uncover new rare genetic variants conferring risk of bipolar disorder and schizophrenia
- Leverage new statistical methods to determine the polygenic architecture of bipolar disorder and schizophrenia
- Discover biomarkers and biological mechanisms of psychosis risk genes

## BRAIN IMAGING: Identify novel brain imaging phenotypes linking genes and clinical phenotypes in a longitudinal setting

Non-invasive MRI technology provides a large opportunity to identify genetically determined brain pathology in patients with psychotic disorders. We will use these methods in our integrated study of brain abnormalities related to clinical characteristics, including developmental trajectories.

### Aims:

- Explore brain network dynamics in psychotic disorders and associated phenotypes
- Identify genetic determinants of brain abnormalities
- Determine brain abnormalities underlying key clinical phenotypes and their genetic architecture

## OUTCOME PREDICTION: Use genetic, environmental and clinical factors to predict disease progress and outcome

The first episode of schizophrenia and bipolar disorder remits in the majority of patients, but with significant risk for relapse. Psychotic disorders thus have a wide range of possible trajectories, which underlines the importance of ascertaining early predictors of treatment response and of clinical outcome.

We will delineate the course of key clinical and cognitive characteristics, with structural and functional imaging, expanding to the genetic and molecular levels of explanation in a longitudinal design. We expect that these multifactorial data and novel statistical tools will enable us to better predict course and outcome with a clinically useful level of confidence.

### Aims:

- Define clinical trajectories from premorbid stages and related pathophysiological processes
- Identify gene-environment interactions at critical phases of neurodevelopment with relation to clinical outcome, including mortality
- Develop prediction and stratification tools for disease course and outcome

## CLINICAL INTERVENTION: Translate pathophysiological discoveries into clinical and pharmacological interventions

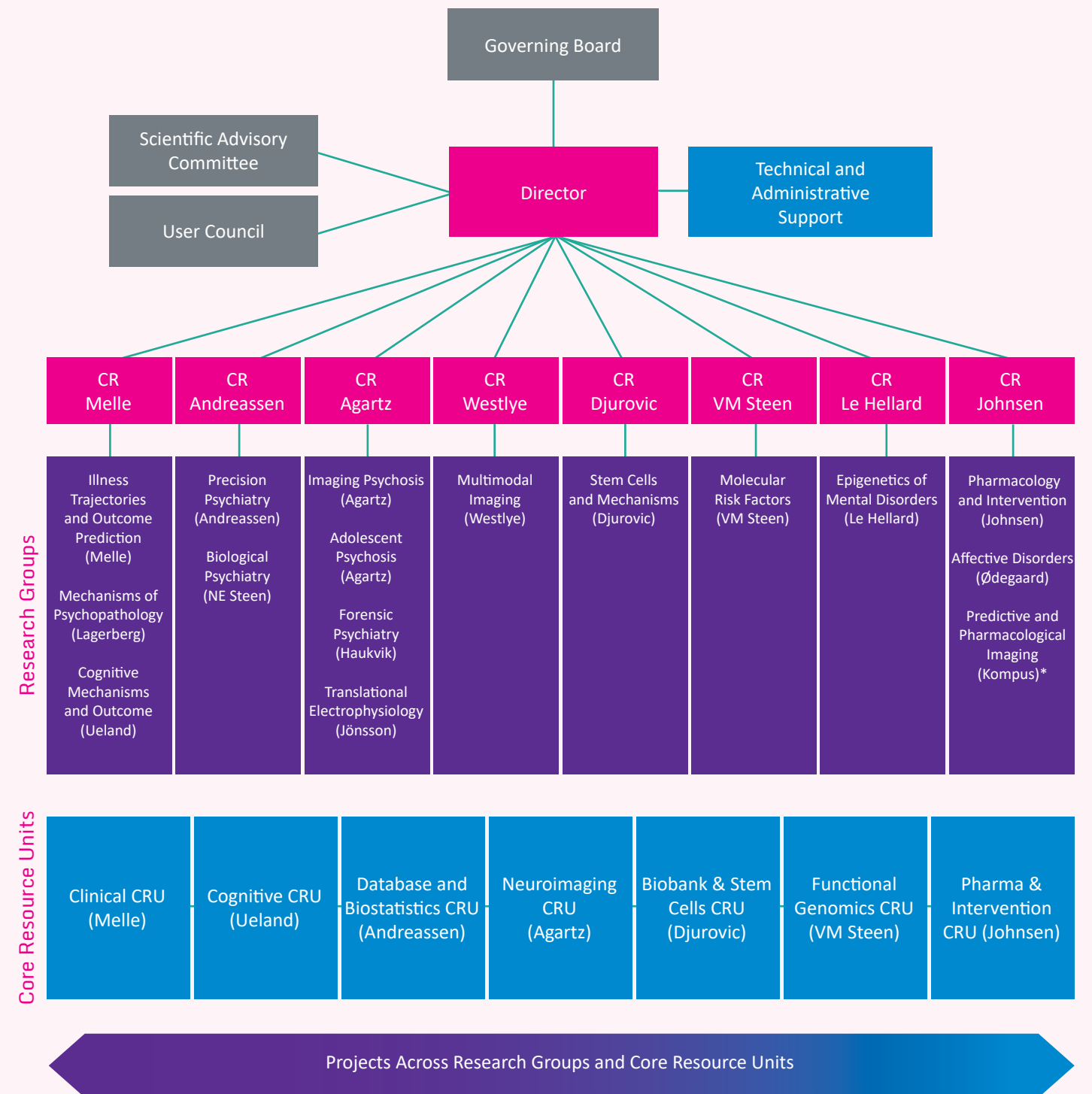
It is a major challenge to move from statistical genetics associations in large samples, to the underlying disease mechanisms of psychosis in individual patients. We will use our rich database and stem cells technology to study immune- and lipid-related pathways based on our previous findings.

### Aims:

- Determine immune and lipid-related mechanisms in psychotic disorders
- Develop a stratification approach based on immune dysfunction profiles
- Perform immune system-related interventions in psychotic disorders



## Organization of the Centre



CR: Core Researcher, CRU: Core Resource Unit

\*The group will be replaced by a new group led by Renate Grüner in January 2021.



# Governing Board

Chair:  
**Dag Kvale**

Professor  
Head of Institute  
Institute of Clinical Medicine  
University of Oslo



Board member:  
**Marit Bjartveit**

Clinic Manager  
Division of Mental Health  
and Addiction  
Oslo University Hospital



Board member:  
**Trine Waaktaar**

Professor  
Vice Dean of Studies  
Faculty of Social Sciences  
University of Oslo



Board member:  
**Marit Bakke**

Professor  
Vice Dean for Research  
Faculty of Medicine and  
Dentistry  
University of Bergen



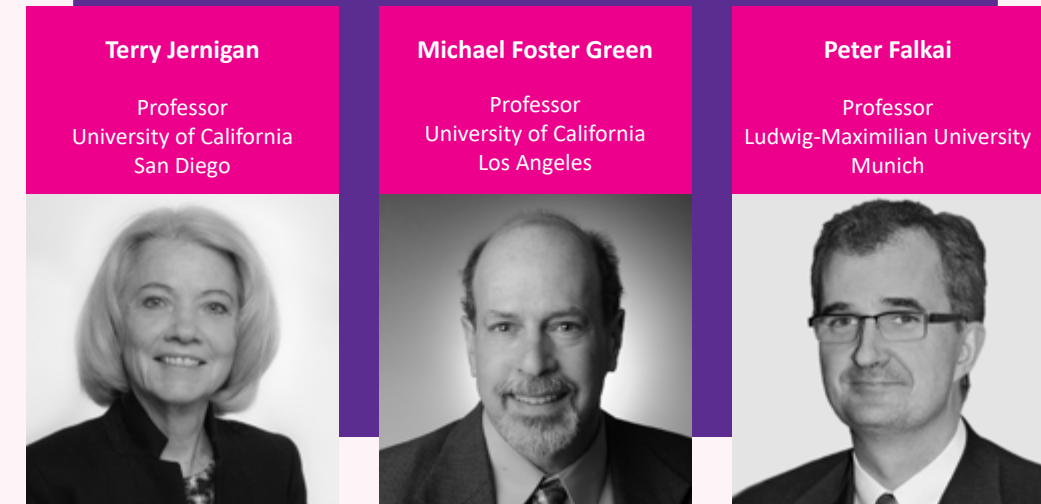
Board member:  
**Hans Olav Instefjord**

Director  
Division of Psychiatry  
Haukeland University  
Hospital





## Scientific Advisory Committee



### **Professor Terry Jernigan:**

Professor in Cognitive Science, Psychiatry, and Radiology, and Director of the Center for Human Development, University of California, San Diego (UCSD), USA, as well as Co-Director of the Coordinating Center for the ABCD Study.

### **Professor Michael Foster Green:**

Professor-in-Residence at the Department of Psychiatry and Biobehavioral Sciences and the Semel Institute for Neuroscience and Human Behavior at the Geffen School of Medicine at the University of California Los Angeles (UCLA), USA. He is also Director of the Treatment Unit of the Department of Veteran Affairs VISN 22 Mental Illness Research, Education, and Clinical Center (MIRECC).

### **Professor Peter Falkai:**

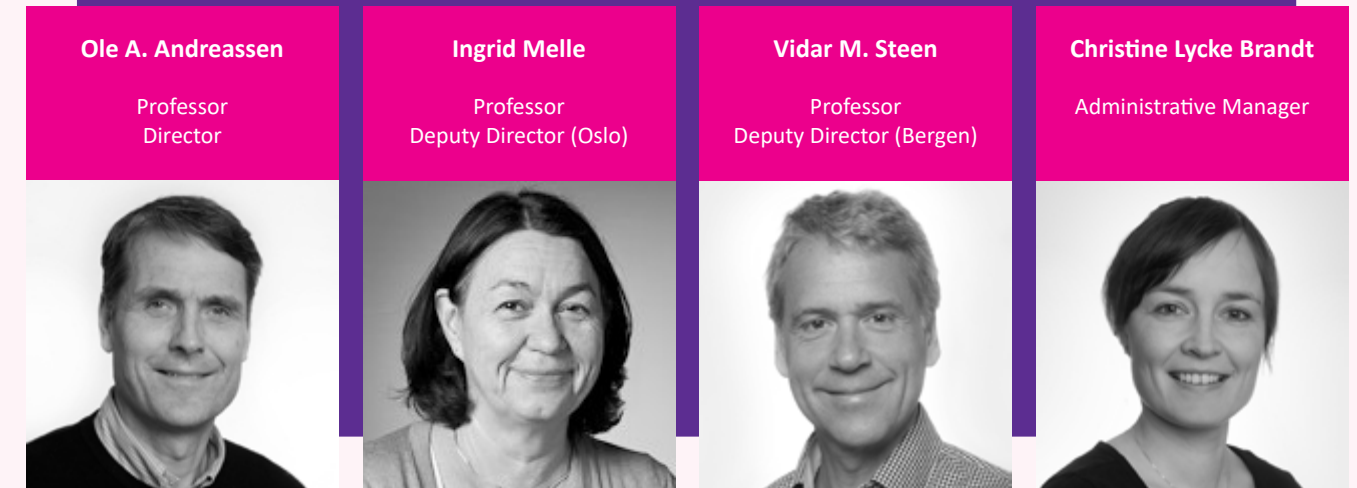
Professor of Psychiatry and Psychotherapy and Chairman of the Department of Psychiatry and Psychotherapy of the Ludwig-Maximilian University in Munich, Germany. He was Chairman of the DGPPN from 2011-2012 and Chairman of the Council of National Societies (NPAs) of the European Psychiatric Association (EPA) from 2012-2014.

### **Their tasks are as follows:**

- Provide advice to the NORMENT leadership in strategic decisions.
- Contribute to NORMENT's research activity by evaluating and advising on the activities within each of the research groups of the Centre and by acting as scientific advisors to the Centre Director.
- Take an active part in NORMENT's annual meetings. Participate in preparing an annual written evaluation with SWOT analysis. Contribute by giving an annual lecture at postgraduate level.



## Centre Management



## Scientific Management

Eight Core Researchers (CR) with complementary expertise from different disciplines constitute the scientific management of the Centre.

- Ole A. Andreassen, Professor, University of Oslo
- Ingrid Melle, Professor, Oslo University Hospital
- Vidar M. Steen, Professor, University of Bergen
- Ingrid Agartz, Professor, University of Oslo
- Srdjan Djurovic, Professor, Oslo University Hospital and University of Bergen
- Stéphanie Le Hellard, Professor, University of Bergen
- Lars T. Westlye, Professor, University of Oslo
- Erik Johnsen, Professor, Haukeland University Hospital

In addition to being part of the scientific leader team, each CR is the head of a Research Group ([See page 31](#)).



Top left to right: Stéphanie Le Hellard, Ingrid Agartz, Srdjan Djurovic, Erik Johnsen, Ingrid Melle, Lars T. Westlye, Ole A. Andreassen, Vidar M. Steen.





## User Involvement

Lena-Maria Haugerud



Fred Gerkum



Inger Hagen



Fabian Stang



### User Council

NORMENT's User Council represents the user community, and consists of individuals who have lived experience, competency and expertise related to mental health. The members of the User Council complement and support the Centre in its effort to carry out research that is relevant for society.

The User Council meets four times a year and provides input to research strategy, gives advice on practical research protocols, and is consulted on matters that affect participants in the studies. The User Council also contributes to dissemination activities, and the members of the Council help strengthen the communication between NORMENT, the user organizations and the community at large.

**In 2020, the members of the User Council were:**

**Lena-Maria Haugerud**, National Association for Prevention of Self-Harm and Suicide (LFSS)

**Fred Gerkum**, Norwegian Bipolar Association

**Inger Hagen**, The Carers Centre Oslo, and Mental Health Carers Norway (PIO, LPP)

**Fabian Stang**, Lawyer and Politician

In addition to the regular meetings in 2020, the members of the User Council were invited to the NORMENT Annual Retreat in September. At this year's retreat, member Fred Gerkum contributed by presenting his personal experiences with bipolar disorder.

### User Representative

NORMENT has an employed part-time User Representative to strengthen the user perspective in the research. The User Representative participates in daily activities at the Centre and brings the user perspective into group meetings, project planning, grant applications, practical operation procedures, and dissemination activities with a focus on Facebook and public events. Further, the User Representative is involved in projects where the user perspective is particularly relevant, such as the development of smartphone apps and other digital methods of data collection, and acts as a link to user organizations, such as the Norwegian Bipolar Association.

Marthe Hagen held this position for three years until Cecilie Busch-Christensen took over the role from September 2020 onwards.



## Technical and Administrative Support

In order to perform excellent research, NORMENT is dependent on well-organized support functions that ensure a stable and efficient infrastructure. The Centre is lucky to have a great team of technical and administrative personnel who continuously work to fulfil these functions in a good way. Support functions span from IT assistance and project economy to communication and project coordination.

Technical and administrative support has become increasingly important as the Centre has grown from about 80 employees in 2013 to more than 200 people involved in 2020. In addition, NORMENT affiliates are located at several sites in Oslo and Bergen, and are employed at four different institutions (University of Oslo, University of Bergen, Oslo University Hospital, Haukeland University Hospital).

Both the size and organization of the Centre demand well-working systems for internal communication and information flow. During the pandemic, digital platforms have been more important than ever, and here support personnel have had a central role. Almost all Centre meetings in 2020 have been on Zoom, and the NORMENT intranet, Wiki and Slack have been increasingly used for exchange of both formal and informal information across the Centre.

Technical support for data storage and computational platforms is also essential. Personnel in the Database CRU at the Centre have done a tremendous job in 2020 to update and improve the central database (TSD) during the pandemic. The database with all research data is carefully quality controlled and stored on a secure server that is available across the Centre. Database staff clean and prepare data for analysis and ensure data security and adherence to national and international regulations. Support personnel also keep track of project budgets and yearly reports required by funding agencies, and work to improve central administrative systems, procedures and protocols that are essential for an efficient research organization.



The Centre administration is located in Building 49, Ullevål Hospital, Oslo



# Core Resource Units

The daily infrastructure for collection, storage, and processing of scientific data at NORMENT is divided into seven different Core Resource Units (CRU). These are sections that are responsible for and have expertise in different methodological aspects of the data collection, and reflect that the Centre has a strong focus on “vertical synergy” and thereby the integration of various research methods and approaches.

Most scientific projects at the Centre include several Core Resource Units, since they are based on data collected from different groups and involve both clinical and other information about the participants.

The main responsibilities of the different Core Resource Units are described below.

## Clinical CRU

Leader: Ingrid Melle

Manager clinical assessment: Trine Vik Lagerberg

The Clinical CRU has the main responsibility for recruitment and standardized scheduled clinical assessments of participants with psychotic disorders in the core research studies at NORMENT. This includes development and maintenance of the common clinical assessment protocol and quality assurance of assessments. The quality assurance includes standardized training of assessment team members, quality assurance and reliability of ratings, preparation of data for entry into the clinical database, and supervision of assessment team members. The assessment team consists of PhD students and research assistants with clinical qualifications to do diagnostic and symptom assessments, in most cases psychiatrists/psychiatric residents or clinical psychologists from the “Illness trajectories and functional outcome”, “Mechanisms of psychopathology”, and “Biological psychiatry” research groups at the Centre.

## Cognitive CRU

Leader: Torill Ueland

Manager cognitive assessment: Hanne Christine Mohn

The Cognitive CRU conducts neuropsychological assessment of participants recruited for the core research studies at NORMENT. This includes assessment of patients with psychotic disorders and healthy control individuals at all time-points (baseline and follow-up). The group provides neuropsychological reports for clinical participants. The work of the group also includes development and maintenance of the cognitive assessment protocol and quality assurance of assessments. Quality assurance includes standardized training of assessment team members, calibration to ensure reliability of ratings, as well as preparation of data for entry into the database, and supervision of assessment team members. The assessment team responsible for the clinical participants consists of clinical psychologists and PhD students with qualifications to do neuropsychological assessments. The assessment team responsible for assessing healthy controls consists of psychology students and master degree holders.

## Database and Biostatistics CRU

Leader: Ole A. Andreassen

Manager: Thomas Bjella

The main purpose of the Database and Biostatistics CRU is to develop and maintain secure and accessible storage structures, analytical tools, and communication platforms that facilitate and accelerate the process between data collection and data distribution at NORMENT. The unit is connecting the seven Core Resource Units at the Centre, and is integral in defining data properties for all research groups. This includes: 1) Database solution for integration of multidisciplinary data: Setting up a common procedure for data formatting, data transfer and data storage across all units; 2) Communication: Better and transparent communication lines, and regular update intervals on all data; 3) eHealth: eNORMENT service, make all data collection from electronic data capture systems; 4) Ethics and GDPR: Ethical approval for digital consent, and remote web form access; 5) Biostatistics service: Distribute method descriptions and guidelines for big data analysis, and provide code and consultation for data analysis.



## Neuroimaging CRU

Leader: Ingrid Agartz,

Manager MRI: Lars T. Westlye, Manager EEG: Torbjørn Elvsåshagen

The Neuroimaging CRU has the main responsibility for providing solid state-of-the-art methodology and infrastructure for magnetic resonance imaging (MRI) and electroencephalography (EEG) in the study of severe mental illness. This includes implementation of standard protocols for MRI and EEG, coordination between different research projects at the Centre, and a close collaboration with the Core Facility at the Department of Radiology, Oslo University Hospital. The Neuroimaging CRU works to guarantee streamlined logistics from collection to storage and processing of imaging data, including access to optimal methods for large-scale as well as innovative imaging (e.g. brain structural, functional, blood flow, metabolism, whole body scanning, electrophysiology), and aid to research groups both within and outside NORMENT. The CRU is also responsible for coordination of internal procedures and routines, follow-up of clinical aspects of MRI (e.g., incidental findings), and training of new staff.

## Biobank and Stem Cells CRU

Leader: Srdjan Djurovic

The Biobank and Stem Cells CRU coordinates all biobank activities at NORMENT. This includes biological sampling (blood, urine, saliva etc.), treatment of samples (storage, tracking, retrieval), quality control, and shipment between different partners. The CRU also coordinates with the Norwegian Institute of Public Health, and contributes to data capture, organization and data flow. The Biobank and Stem Cells CRU has also established the required competence and facilities for human induced pluripotent stem cell (hiPSC) technology unit in our Centre allowing investigation of neuronal cells from participants. Validated iPSCs are differentiated to neural progenitor cells (neural conversion) and regionalized neuronal subtypes, as well as astrocytes/glia populations under standard in-house methods. Further activities will be aimed to develop a psychopharmacological screening platform for psychiatric disorders using iPSC-derived neurons.

## Functional Genomics CRU

Leader: Vidar M. Steen

Co-leader: Stéphanie Le Hellard

The Functional Genomics CRU has expertise and infrastructure for large-scale analysis of the genome, focusing on global gene expression and epigenomics. The team is also equipped for explorative studies and validation experiments in relevant cell cultures and animal models. The current prioritized tasks are RNA sequencing and DNA methylation assays of the clinical samples (patients with schizophrenia spectrum disorders or bipolar disorder as well as healthy controls). We are also responsible for implementation and development of bioinformatic tools for data analysis, including multi-omic methods for integration of corresponding genomic, transcriptomic and epigenomic data.

## Pharma and Intervention CRU

Leader: Erik Johnsen

The Pharma and Intervention CRU has the main responsibility for facilitating, coordinating and running intervention studies with medicinal products and other treatments for mental disorders. The CRU furthermore follows individuals with mental disorders in a long-term perspective in order to identify markers and predictors of the course of the disorders, as well as effects and side effects of treatment. The CRU includes three research groups covering the areas 1) Pharmacology and intervention, 2) Affective disorders, and 3) Predictive and pharmacological imaging.



## Research Groups

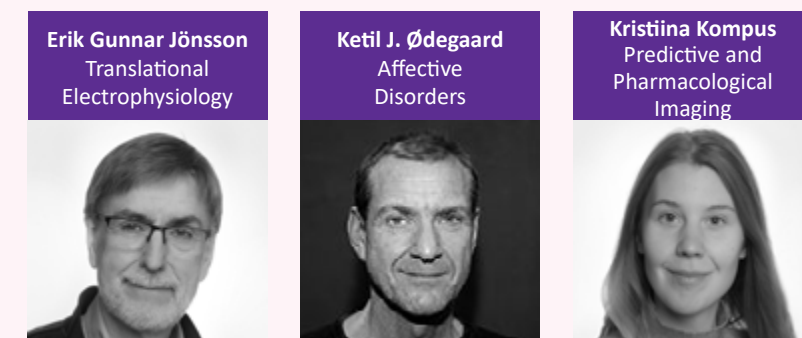
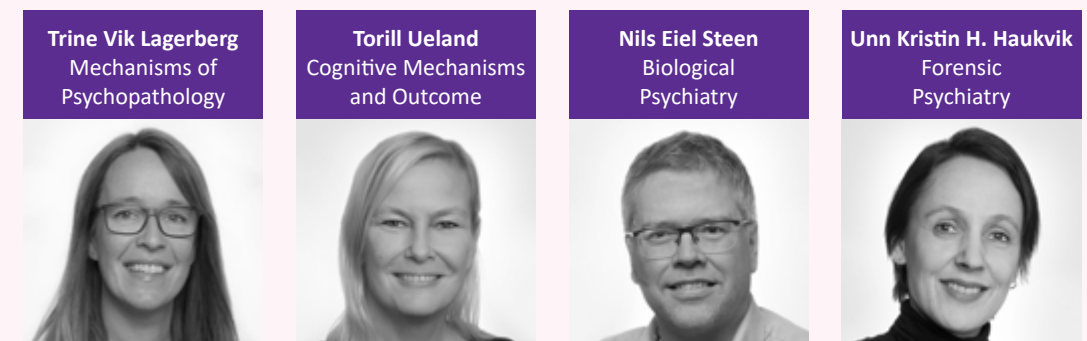
We have organized our research into groups with complementary expertise. Each group has its own Group Leader and a particular focus area of research, but there is a close collaboration across groups and scientific disciplines, as reflected in the “vertical synergy” approach at the Centre ([See page 14](#)).

The number of Research Groups increased from eight to fifteen during 2018, when we entered the second phase as a Centre of Excellence. Some of the new groups are already well-established at their institutions, while others have just recently started. The inclusion of new groups is also part of our career development strategy to give early-stage researchers more responsibility and experience.

All Research Groups and Group Leaders are listed below. Each group has a formal affiliation to one specific Core Researcher (CR) in the scientific management, as shown below:

	CR Melle	CR Andreassen	CR Agartz	CR Westlye	CR Djurovic	CR VM Steen	CR Le Hellard	CR Johnsen
Research Groups	Illness Trajectories and Outcome Prediction (Melle)	Precision Psychiatry (Andreassen)	Imaging Psychosis (Agartz)	Multimodal Imaging (Westlye)	Stem Cells and Mechanisms (Djurovic)	Molecular Risk Factors (VM Steen)	Epigenetics of Mental Disorders (Le Hellard)	Pharmacology and Intervention (Johnsen)
	Mechanisms of Psychopathology (Lagerberg)	Biological Psychiatry (NE Steen)	Adolescent Psychosis (Agartz)					Affective Disorders (Ødegaard)
	Cognitive Mechanisms and Outcome (Ueland)		Forensic Psychiatry (Haukvik)					Predictive and Pharmacological Imaging (Kompus)
			Translational Electrophysiology (Jönsson)					

In addition to our eight Core Researchers ([see page 23](#)), we have seven Group Leaders:





## Illness Trajectories and Outcome Prediction

Group Leader: Ingrid Melle

### About the group

Psychotic disorders show large variations in course and outcome. Early course parameters, including length of untreated illness and initial treatment response, are among the most important predictors of long-term outcome. Recent studies have identified a range of genetic loci and environmental risk factors associated with schizophrenia and bipolar disorder. Etiological models for psychotic disorders depict clinical illness as prompted by environmental hits, on the basis of an underlying (genetic) vulnerability.

To what extent vulnerability factors primarily shape an early change-resistant susceptibility and to what extent they are involved in active processes driving symptom formation is not known. Our aim is to identify symptom trajectories and correlates through prospective longitudinal studies of first-treatment participants. The group studies the longitudinal development of negative and psychotic symptoms including the opposite outcomes of full functional recovery versus treatment resistance and suicide with a specific focus on the correlates of vulnerability factors.

### Main projects

- Long term development of schizophrenia, bipolar disorders and psychotic states that do not meet criteria for schizophrenia or bipolar disorder at first treatment
- Long term development of negative symptoms
- Long term development of substance use
- Long term development of full functional recovery
- Long term risk of suicidal behavior and suicide

### Scientific Achievements 2020

- Studied the role of sleep disturbances in psychotic disorders and has found that sleep disturbances impact both clinical symptomatology and cognitive functioning. In addition, sleep disturbances mediate the association between childhood trauma and clinical symptoms (Laskemoen et al)
- Investigated clinical features of psychosis not otherwise specified (NOS), including the different subgroups comprised by this diagnosis, and found that psychosis NOS takes an intermediate position between schizophrenia and bipolar disorder (Widing et al).
- Studied the association between polygenic risk scores for schizophrenia and apathy in psychotic disorders, and in collaboration with the cognitive group the association between polygenic risk scores and cognitive functioning. We did not find any significant associations (Lyngstad et al, Engen et al).
- Investigated the course of apathy over the first ten years of schizophrenia, and found that the main change in level of apathy took place during the first year of treatment (Lyngstad et al).

## Mechanisms of Psychopathology

Group Leader: Trine Vik Lagerberg

### About the group

The group aims to expand the understanding of mechanisms underlying the significant symptom variation seen in psychotic disorders over time and between individuals. We aim to provide rich clinical characterisations and to investigate the relationship between core affective and psychotic symptoms on one hand, and affective dysregulation, substance use and circadian rhythms on the other. To do so, we have developed and implemented digital tools (smartphone application, actigraphy) designed to prospectively capture a fine-grained picture of several dimensions of symptoms and behaviour.

In collaboration with other groups in the centre, we will combine such observations with data from cognitive, brain imaging, genetic and biochemical assessments. The group is also investigating how digital tools can be used in a clinical setting to boost treatment in bipolar disorder, and as a tool for assessing treatment response in clinical trials. Lastly, the group is involved in a newly established specialized clinical research unit for bipolar disorder at Nydalen District Psychiatric Centre.

### Main projects

- Digital monitoring of illness fluctuations in psychotic disorders (MinDag)
- Affective lability across psychotic disorders
- Substance use in bipolar disorder
- Clinical features of bipolar disorder: psychotic symptoms and circadian rhythms
- Vitamin D supplementation in psychotic disorders – RCT (Plan D)

### Scientific Achievements 2020

- No significant differences in levels of affective lability between bipolar I disorder and schizophrenia, but higher levels in bipolar II disorder (Høegh et al., submitted)
- The prevalence of psychotic symptoms in bipolar disorder is high (Aminoff et al., submitted).
- Individuals with bipolar disorders do not have greater misperception of sleep than healthy controls (Ihler et al., in prep).
- Cannabis use disorders are associated with inadequate treatment regimens in bipolar disorder (Icick et al., submitted)



## Cognitive Mechanisms and Outcome

Group Leader: Torill Ueland

### About the group

The aim of the group is to capture the variation and course of cognitive functioning in psychotic disorders and to identify mechanisms underlying cognitive dysfunction and cognitive heterogeneity. Our goal is to provide better prognostic guidance and improved individualized intervention programs including cognitive remediation.

Our studies require both large scale datasets of cognitive performance in combination with other biomarkers, as well as smaller richer datasets measuring cognition in the same individual over time. Achieving our aims entails using cognitive and clinical data, brain imaging data, genetic data and biochemical assessments, in collaboration with other research groups in the Centre.

### Main projects

- Long term course of intellectual functioning and cognition in first-episode schizophrenia spectrum disorders and bipolar disorder
- Cognition and negative symptoms in first-episode schizophrenia spectrum disorders: Long term course and associations to functional outcome
- Cognitive heterogeneity and underlying mechanisms in psychotic disorders
- The ecoval study: Linking social processes across explanatory levels - from electrophysiological mechanisms, through social cognition to real-world social interaction
- Inflammation and cognition in psychotic disorders

### Scientific Achievements 2020

- Three distinct cognitive subgroups can be identified across schizophrenia and bipolar disorder based on the intellectual trajectory from premorbid phase to illness onset (Vaskinn et al.).
- Patients with prominent negative symptoms have an inverse brain structure function relationship indicating that better cognitive functioning is associated with smaller brain volume in anterior singulate cortex (Haatveit et al.).
- There is an illness-specific association between childhood sexual abuse and physical neglect and adult affective theory of mind in individuals with schizophrenia (Vaskinn et al.).
- We found no association between schizophrenia PGS and cognitive phenotypes or cognitive PGS and cognitive phenotypes in patients with psychotic disorders (Engen et al.).
- Contributed with a state-of-the-art description of social cognition research in schizophrenia (Vaskinn and Horan).

## Precision Psychiatry

Group Leader: Ole A. Andreassen

### About the group

The group uses big data and new analytical methods to clarify causes and risk factors in severe mental disorders to improve prevention, diagnosis and treatment, as well as treatment stratification tools for precision medicine. We apply state-of-the-art methodology to examine data from NORMENT and large databases that include several million individuals. We develop mathematical models to understand variation in the human genome, to improve our ability to identify genetic and environmental factors contributing to disease development, and factors to predict treatment response.

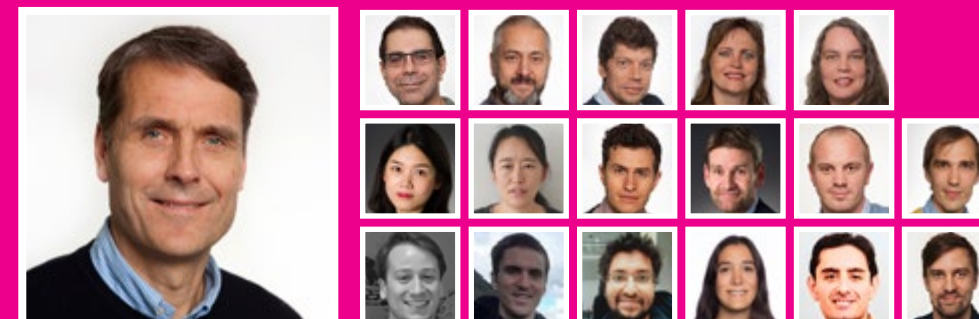
This research is performed in close collaboration with international researchers and global consortia, with a strong focus of Nordic partners to leverage the large potential of registries and biobanks. The group's long-term goal is to develop the framework for precision medicine approaches – to apply the discoveries of causal factors in clinical practice – which has great potential in psychiatry.

### Main projects

- Identifying genetic risk factors for mental and neuropsychiatric disorders (PGC) and mapping imaging genetics factors in mental disorders (ENIGMA), leading bipolar disorder projects
- Identifying gene - environment interplay in neuropsychiatric and mental disorders in Nordic samples (Tryggve) to identify resilience factors, and neurodevelopmental mechanisms (MoBa)
- Characterize comorbidity and longitudinal development of severe mental disorders, and role of lifestyle factors (CoMorMent)
- Antipsychotic treatment stratification (pharmacogenetics) and lithium effect (R-LINK)
- Develop statistical genetics tools, based on uni- and bivariate mixture models (MiXeR), multivariate omnibus statistical test (MOSTest), and improve prediction and stratification with machine learning approaches

### Scientific Achievements 2020

- Discovered polygenic factors involved in several different mental disorders and neuropsychiatric diseases (Smeland et al., Cuellar-Partida et al.)
- Discovered brain structure abnormalities in mental disorders and genetic factors associated with brain structure variation (van der Meer et al., Holleran et al., Grasby et al.)
- Identified shared genetic factors across mental, neurological, cognitive and somatic traits, with clinical relevance (Bahrami and Steen et al., Shadrin et al., Smeland et al., O'Connell et al.)
- Developed new statistical genetics tools to better capture polygenic variation relevant for complex human disorders and traits (Fan et al, van der Meer et al., Shadrin et al. Holland et al.)





## Biological Psychiatry

Group Leader: Nils Eiel Steen

### About the group

The group investigates biological mechanisms in schizophrenia and bipolar disorder by integrating genetic, biological, environmental and clinical data in a translational approach. We use the richly characterized TOP/NORMENT sample in combination with data from international genetic consortia and health registries. Several biological processes related to severe mental disorders and their treatment are investigated with a special focus on inflammation and mechanisms of cardiovascular comorbidity as well as candidate metabolism pathways and the endocrine stress regulation system.

The overall goal is to increase the knowledge of the underlying biological mechanisms of these disorders with potential implications for prevention, treatment, course prediction and diagnostics. Our aims include gaining knowledge of underlying immune mechanisms of severe mental disorders, identifying pathophysiological pathways, and identifying stress-related mechanisms of severe mental disorders.

### Main projects

- The immune system and severe mental disorders, genetics and associations to clinical characteristics and pharmacological treatment
- Cardiovascular risk and disease in severe mental disorders – occurrence and mechanisms
- Sex-dependent somatic and pharmacological aspects in severe mental disorders
- The role of stress and psychophysiology in severe mental disorders
- Metabolomic and proteomic biomarkers of severe mental disorders

### Scientific Achievements 2020

- Low-grade inflammation in psychotic disorders associated with increased cardiovascular risk (Reponen et al.).
- Childhood trauma associated with cortisol metabolism in adults with psychotic disorders (Aas et al.).
- Association between treatment-resistance and genetic risk in schizophrenia (Werner et al.).
- Several genetic variants linked to both severe mental disorders and body weight (Bahrami and Steen et al.).
- Dysregulation in kynurenine pathway, noradrenergic and purine metabolism across psychotic disorders (Steen et al.).

## Imaging Psychosis

Group Leader: Ingrid Agartz

### About the group

The focus of the group is brain neuroanatomy studied with advanced magnetic resonance imaging (MRI) methodology and how it relates with aetiology (genes and environmental factors) and early life risk factors (e.g. obstetric complications) as well as with the clinical phenotype, substance use, immune markers, infection exposure and medication. Advanced MRI phenotypes are used (e.g. cortex thickness, volume and area, myelin mapping, contrast, DTI).

We investigate large cohorts of schizophrenia or bipolar disorders. In longitudinal follow-up studies, we investigate brain trajectories over 13 years. One subproject (Youth-TOP) focuses on early-onset psychosis in adolescents, their brain development over time, the biomarkers, and early risk factors. We participate in several international consortia and coordinate two international collaborations on adolescent psychosis.

### Main projects

- MRI studies of primary sensory and motor brain regions in psychosis disorders
- Importance of birth and pregnancy complications to brain development and cognition in severe mental illness
- Brain effects of CNS biomarkers and infections exposure in severe mental illness
- Bridging neuroscience research with clinical applications, using machine learning approaches and multiparametric myelin mapping in psychotic disorders
- Clinical investigation and follow-up of Youth-TOP participants at the University of Oslo and Karolinska Institutet, Stockholm, and coordination of ENIGMA-EOP study and cognitive networks for adolescents with early-onset psychosis

### Scientific Achievements 2020

- In multisite mega-analyses, we characterized hippocampal subfield alterations in bipolar disorder (Haukvik et al.) and the pattern of subcortical brain change in adolescent early-onset psychosis (Gurholt et al.).
- In adult patients on the schizophrenia-bipolar disorder spectrum and healthy controls, a history of asphyxia-related obstetric complications was related to smaller ICV, total brain, white and gray matter volumes and total surface area, but not to cortical thickness (Wortinger et al.).
- In long-term treated patients with schizophrenia from the Swedish HUBIN cohort, repeated MRI over 13 years showed brain volume loss at similar rate as healthy controls. We observed an accentuated white matter loss in patients at later disease stages, which was related to nervous-system drug use (Barth et al.).
- Antipsychotics-medicated men with schizophrenia investigated with cardiovascular MR had lower left ventricular ejection fraction, which showed a negative association to non-clozapine antipsychotics treatment (Andreou et al.).
- In adolescent early-onset psychosis samples, immune and lipid profiles were abnormal compared to healthy controls (Wedervang-Resell et al.). We report signs of preclinical atherosclerosis investigated with carotid ultrasound.



## Forensic Psychiatry

Group Leader: Unn Kristin H. Haukvik

### About the group

The group has an interdisciplinary approach to the study of violence and aggression in severe mental disorders. Our main focus is to study biopsychosocial factors involved in violent behaviour, and how they interact to affect violence risk in severe mental disorders, by combining thorough clinical investigation with advanced brain imaging methods and registry data. As a thematic research group, we collaborate closely with the other research groups within the Centre.

We also explore the potential legal implications of our research, in the intersection between law and neuroscience. We use frontline MRI-methodology, to explore neurobiological underpinnings of violence and aggression, and combine this knowledge with social and psychological factors to understand the patterns leading to violent behaviour in severe mental disorders and map targets for treatment and prevention. We aim to link our research to the Norwegian medical model of criminal insanity and to contribute to strengthening legal rights of patients and reduce the stigma associated with violence in severe mental disorders.

### Main projects

- Violence in severe mental disorders; biological, psychological, and social patterns (sTOP)
- Violence in psychosis: towards neuroimaging-informed prediction of violence risk?
- Insight and phenomenology in psychotic disorders with comorbid violence
- Neuroinflammatory biomarkers of aggression in severe mental disorders: clinical implications for prevention and treatment
- Reworking the medical model of criminal insanity in the intersection between law and science – empirical data and the legal significance of psychosis

### Scientific Achievements 2020

- Hippocampus and amygdala volume reductions are related to a history of violence in schizophrenia (Tesli et al).
- Cholesterol levels are not associated with aggression as a state marker (Hjell et al).
- Schizophrenia patients with a history of violence have experienced more severe childhood trauma and neglect than non-violent schizophrenia patients (Storvestre et al).
- A multilevel analysis of different rules of legal insanity, show that the Norwegian medical model have advantages and limitations compared to open or mixed models (Gröning, Haukvik et al).

## Translational Electrophysiology

Group Leader: Erik Gunnar Jönsson

### About the group

The group studies nerve cell function in patients with psychosis and other psychiatric disorders using electroencephalography (EEG) and related electrophysiological methods. The electrophysiological indices are also analyzed in connection with clinical symptoms, genetic variation, morphological variation in the brain, computerized models of nerve cells, and stem cell based methods.

The group aims to examine whether EEG-based indices of synaptic function and neuronal excitability regulation are altered in schizophrenia and bipolar disorder. We assess effects of novel schizophrenia and bipolar disorder genetic risk loci on the EEG-based indices and to examine whether the EEG-based indices can be used to predict illness severity in schizophrenia and bipolar disorder.

### Main projects

- Genes and the synapse in severe mental illnesses: From stem cells and in vivo brain function to clinical implications (examination of synaptic function in vivo using electrophysiological techniques in individuals with psychotic disorders and healthy controls, in vitro using iPSC-derived neurons from the same participants, and in silico using computational models of synaptic function)
- Sensory and motor networks in psychotic disorders: From structure and function to phenomenology (examination of the relationship between brain myelination, aberrant sensory processing and phenomenology of psychotic disorders)
- Equivalence class formation and cortical synaptic function in autism spectrum disorders (examination of the role of synaptic function and plasticity in the autism spectrum disorders and the relationship between equivalence formation and synaptic function).

### Scientific Achievements 2020

- We found that modulation of the visual evoked potential is a robust non-invasive index of cortical plasticity (Valstad et al.).
- Analyses showed decreased cortical plasticity in schizophrenia and bipolar disorder (Valstad et al., submitted).
- Preliminary analyses of a novel EEG-based index indicated increased cortical excitability in bipolar disorder relative to controls (Timpe et al., in prep.).
- We found that heart rate variability was reduced and associated with symptoms severity in psychosis spectrum disorders (Benjamin et al.).





## Multimodal Imaging

Group Leader: Lars T. Westlye

### About the group

In order to characterize the dynamic mechanisms of mental disorders across the lifespan, we utilize various brain imaging modalities and approaches, with a particular emphasis on combining measures of structural and functional connectivity with clinical and genetic information.

Structural and functional brain characteristics are highly heritable, and our research aims at increasing our understanding of how gene-environment interactions influence mood, cognition and risk of mental disorders during sensitive periods in life.

### Main projects

- Brains and minds in transition (BRAINMINT): The dark side of neuroplasticity during sensitive life phases
- Genetic and phenotypic architecture of the ontogenetic determinants of severe mental illness (multimodal fusion of brain imaging data, clinical information and genetics)
- IMPLEMENT: Improved personalized medicine through machine learning in mental disorder
- BRAINCHART: Normative brain charting for predicting and stratifying psychosis
- COMMITMENT: CoMorbidity Modeling via Integrative Transfer machine-learning in MENTAL illness

### Scientific Achievements 2020

- Identification of the first gene variants linked to midbrain, pons, and medulla oblongata volumes. (Elvsåshagen and Bahrami et al.)
- Novel insight into genetic factors determining basal ganglia volumes, suggesting specific pathobiological mechanisms involved in the development of neurodevelopmental disorders. (Sønderby et al.)
- Development of a powerful multivariate approach to genome-wide association studies (Van der Meer et al.)
- Novel findings on multidimensional individual (e.g. birth weight) and societal (e.g., socioeconomic status) determinants of child and adolescent neurodevelopment, highlighting the importance of integrating social, psychological, and biological sciences in order to inform political priorities and decisions aiming to improve health outcomes and adaptation during transformative life phases (Alnæs et al.)
- A comprehensive review of recent intranasal oxytocin research, with a specific focus on how its precision can be improved by the complementary consideration of methodology, theory, and reproducibility (Winterton et al.).

## Stem Cells and Mechanisms

Group Leader: Srdjan Djurovic

### About the group

The group's current research aims are to perform molecular genetic analysis to increase the knowledge and expertise in psychiatric genetics and genomics and to identify the molecular networks underlying psychiatric disease as well as to continually develop an organization to support psychiatric genetic and stem cell studies with design and planning.

Our research group is also responsible for the management and operation of the biobank and stem cell facilities at NORMENT. This CRU includes sampling, treatment of samples (storage, tracking, retrieval) and shipment between different partners, as well as data processing / coordination in order to ensure quality of associated data for the collected biobank samples.

### Main projects

- Human induced pluripotent stem cell (hiPSC) technologies in psychiatric molecular genetics
- Psychopharmacological screening platform for psychiatric disorders using iPSC-derived neurons.
- Neuro-immune interactions
- Identifying the polygenic basis of the human brain and neurodevelopmental disorders
- Large-scale investigations of the role of copy number variants in disease, brain phenotypes and cognition

### Scientific Achievements 2020

- Development of novel protocol for the differentiation of iPSC into cortical spheroids.
- Optimization of the co-culturing protocols of iPSC-derived neurons and astrocytes, screening platform for characterization of iPSC-derived astrocytes under baseline and inflammatory conditions, as well as psychopharmacological screening platform - using RNA-Seq, fluorescent microscopy, and various functional assays, incl. multidisciplinary platform combining cell electrophysiology, calcium imaging as well as voltage imaging.
- Identification of molecular networks underlying psychiatric disease (Akkouh et al., Hughes et al.)
- Genome-wide pleiotropy analysis and genetic overlap between neuropsychiatric traits (O'Connell et al.)



## Molecular Risk Factors

Group Leader: Vidar M. Steen

### About the group

Our group aims at identifying and understanding genetic and biological factors that are involved in illness mechanisms and therapeutic response during pharmacological treatment of schizophrenia and bipolar disorder. We use a combination of clinical data, biomarker screening and functional studies in patient samples and various experimental models.

Our main research interest is at present directed towards the role of metabolic factors and inflammation processes in development of psychosis and during antipsychotic treatment. The group is also responsible for running the Genomics Core Facility at the University of Bergen, to provide guidance and service on large-scale genomic analyses, such as whole genome-, exome- and RNA sequencing.

### Main projects

- The effect of drug-related weight gain and lipid disturbances on psychotic symptoms, cognitive function and brain myelin in patients with schizophrenia
- Transcriptional changes in peripheral blood during drug treatment in patients with psychotic disorders: A cross-sectional and longitudinal study
- The molecular mechanisms of antipsychotic-induced metabolic effects
- Low grade inflammation and innate immune responses in peripheral blood as trait or state markers of psychosis
- Genetic risk factors for disease susceptibility and treatment outcome in schizophrenia and bipolar disorder

### Scientific Achievements 2020

- Initiated an experimental study of cultured white blood cells, to examine antipsychotic-mediated effects on innate immunity markers
- Completed RNA seq examination of peripheral blood from longitudinal samples of psychosis patients treated with amisulpride, aripiprazole or olanzapine in a randomized controlled trial
- Contributed to several NORMENT (Elvsåshagen and Bahrami et al.) and international consortia studies (Grasby et al.)
- Contributed to a longitudinal study of psychosis patients treated with amisulpride, aripiprazole or olanzapine in a randomized controlled clinical trial (Johnsen et al.).

## Epigenetics of Mental Disorders

Group Leader: Stéphanie Le Hellard

### About the group

Major mental disorders such as psychotic disorders have a complex and multifactorial etiology. Both genetic and environmental risks have been described and their interaction is still uncertain. We study how the pathology, the genetic factors and the environmental factors can modify the genome by modifying regulatory elements of the genome (epigenetic modifications). Our aims are to understand how environmental risk factors interact with the genetic risk at the epigenetic level, to identify epigenetic biomarkers for disease status, environmental exposure and treatment.

The group consists of people with background in genetics, statistics, medicine and informatics who together bring their complementary expertise to try understand the interaction between genetic and environmental risk in mental disorders. We work in close collaboration with clinicians. We use datasets generated in house or publicly available that combine genetic, epigenetic and gene expression datasets for mental disorders (mostly schizophrenia and bipolar disorders) that are in addition well annotated for environmental factors. We have generated DNA methylation profiles in large samples of patients with bipolar disorders, schizophrenia or ADHD and matched controls.

### Main projects

- Identify epigenetic modifications associated with cannabis use
- Identify epigenetic modifications associated with childhood trauma
- Identify epigenetic modifications associated with antipsychotic treatment
- Identify epigenetic modifications regulated by genetics in the brain
- Characterize the effects of the COVID19 pandemic on mental health

### Scientific Achievements 2020

- Identification of DNA methylation changes associated with genetic variations in the brain (Spindola et al.).
- Linking severe mental disorders to childhood trauma at an epigenetic level (Brunstad et al.).
- Mental health symptoms during the first months of the COVID-19 outbreak in Norway: high resilience in the general population, but increased symptoms in students and people with mental health problems (Hagen et al., submitted).
- Epigenetic Effects of THC and CBD in Neuronal Stem Cells (Stavrum et al.)





## Pharmacology and Intervention

Group Leader: Erik Johnsen

### About the group

We study schizophrenia spectrum disorders at several levels in an integrated fashion, including clinical symptoms and signs, treatment effects and side effects, brain imaging measures, as well as molecular vulnerability and disease mechanisms.

The research group has more than 15 years of experience in conducting researcher initiated drug trials independently of pharmaceutical industry. The group overlaps with the Bergen Psychosis Research Group at Haukeland University Hospital and the University of Bergen.

### Main projects

- The Norwegian Prednisolone in Early Psychosis Study (NorPEPS): A double-blind, randomized, placebo-controlled add-on effectiveness study of prednisolone in early psychosis
- The Neuroinflammation in Adolescents with Psychosis Project (NAPP): An observational cohort-study of young people with psychosis
- The Non-Pharmacological treatment of Psychosis study (NonPharm): An observational cohort study following individuals with psychosis seeking treatment without the use of antipsychotic drugs
- The Placebo-controlled Trial in Subjects at Ultra-High Risk for Psychosis With Omega-3 Fatty Acids in Europe (PURPOSE): A randomized placebo-controlled study of omega-3 fatty acids in ultra-high risk for psychosis to prevent transition to psychosis
- Stems cells in schizophrenia project: Using stem cells to model antipsychotic drug response

### Scientific Achievements 2020

- Superior effectiveness of amisulpride in schizophrenia-spectrum disorders (Johnsen et al.)
- Low remission rate and poor pharmacological guideline adherence in first episode schizophrenia after 1 year (Drosos et al.)
- Hallucinations and delusions respond differently to antipsychotic treatment (Bjarke et al.)
- Childhood trauma influences cognitive functioning in schizophrenia (Mørkved et al.)

## Affective Disorders

Group Leader: Ketil J. Ødegaard

### About the group

We study bipolar disorders and other illnesses of depression using different methods and approaches. Our studies focus on psychopharmacology, neurostimulating treatment, sensor technology, registry research, cognitive function, genetics and brain imaging in bipolar disorders and other illnesses including depression.

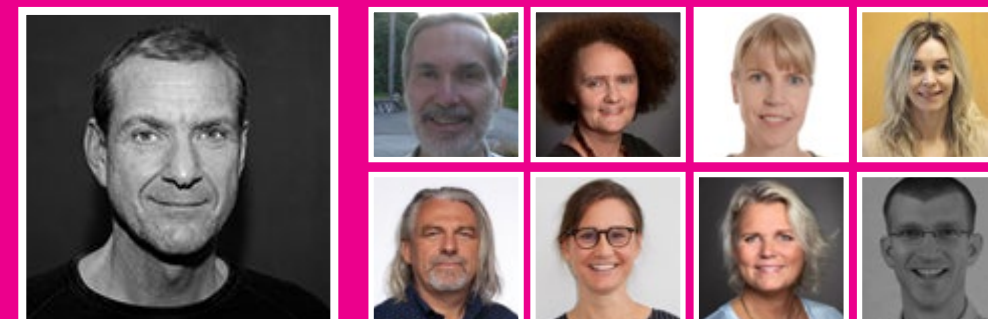
The research group has a translational focus with the aim of contributing to increased etiological knowledge of pathophysiological processes in affective disorders, mainly through clinical intervention studies. The group also covers the Bergen Bipolar and Depression Research group at Haukeland University Hospital, and consists of collaborating researchers with joint projects on mood disorders.

### Main projects

- The Pharmacogenomics of Bipolar Disorder study (PGBD): Identification of genes for lithium response in a prospective sample
- Monitoring of bipolar disorder using sensor technology (part of INTROMAT-study)
- The Global ECT-MRI Research Collaboration (GEMRIC): Establishing a multi-site investigation of the neural mechanisms underlying response to electroconvulsive therapy
- Blue-blocking glasses as additive treatment for mania: A randomized placebo-controlled trial
- Cognitive residual symptoms in MDD. Cognitive remediation in order to prevent new episodes

### Scientific Achievements 2020

- Cognitive deficits in processing speed and executive function persist following first episode depression (Ronold et al.)
- Mathematical methods based on graph theory, may be used to elucidate the mechanisms responsible for the diurnal regulation of motor activity (Fasmer et. al.)
- Machine-learning techniques present promising abilities in discriminating between depressed patients and healthy controls in motor activity time series (Jakobsen et.al.)
- Lithium may be beneficial to neurocognitive functioning in patients with Bipolar disorder and that at the very least it does not seem to significantly impair cognition when used therapeutically (Burdick et.al.)



# Predictive and Pharmacological Imaging

Group Leader: Kristiina Kompus

## About the group

We work on various brain imaging modalities such as functional and structural MRI, diffusion-tensor imaging, magnetic resonance spectroscopy, linking brain imaging data to other variables such as cognition, psychiatric symptoms, inflammation markers and course of illness.

We aim to provide the optimal multimodal approach to identify imaging markers, which would reliably predict course of illness and response to psychiatric medication, enabling improved treatment options at the earliest possible timepoint.

## Main projects

- Multimodal integration of DTI, fMRI, sMRI and MRS data in psychosis patients
- Excitatory/inhibitory neurotransmission: relation to hallucinations and medication
- Dynamic connectivity analysis of functional connectivity networks in psychosis patients
- Inflammation markers in blood and brain

## Scientific Achievements 2020

- Explored the neurochemistry of auditory verbal hallucinations in schizophrenia by investigating the intra-regional Glu-GABA and inter-regional Glu-Glu imbalance using 1H-MRS (Hjelmervik et al.)
- Demonstrated the importance of glutamatergic modulation of long-range connections and wider networks in the brain during perceptual inference (Kompus et al.)
- Investigated dynamic functional connectivity patterns in schizophrenia and the relationship with hallucinations (Weber et al.)
- Reported that hallucinating schizophrenia patients have longer left arcuate fasciculus fiber tracks (Falkenberg et al.)

# Collaboration Across Research Groups

NORMENT is a cross-disciplinary research centre, where sharing of competence and infrastructure is a key principle. We have set aside about half of the Centre of Excellence grant to fund our core infrastructure (Core Resource Units), to enable easy access to state-of-the-art methodology, infrastructure for recruitment and assessment of participants, and database and biobank services. Most if not all research activities at the Centre depend on this tight integration and efficient use of resources across different research groups.

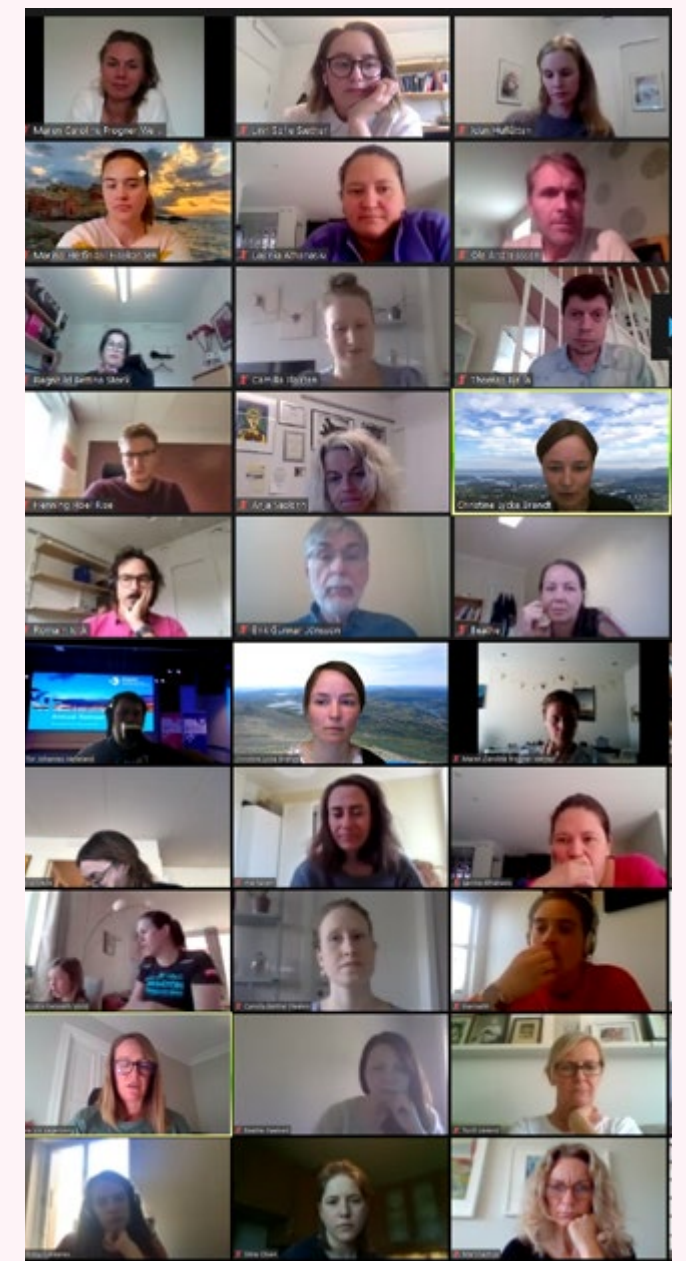
A large degree of NORMENT's research is generated from multidisciplinary projects, and this is also the framework for new project developments and grant applications. Collaborative projects within the Centre are organized through the monthly Synergy Meetings and named Synergy Projects with project lists available on our intranet.

The projects are grouped under different research topics, such as Cannabis, eNORMENT (electronical data collection), Genetics, Imaging Genetics, Immunology, Methylation, mRNA, MRI, and Polygenic Risk Score.

There are specific added values of this cross-disciplinary approach that are related to the main research topics and aims of the Centre:

1. Genetics: Combine large amounts of genetic data with relevant environmental factors, and move this to experimental studies in human stem cells.
2. Brain Imaging: Use advanced imaging technology to study brain characteristics in large groups of participants who are also genotyped and extensively clinically characterized, a sample which is unique internationally.
3. Outcome Prediction: Determine the association between genes, environment, and their effect on different illness trajectories, with the potential of leading to new tools for prediction and early identification of illness.
4. Clinical Intervention: Translate genetic, immunological, imaging, and other pathophysiological findings into clinical and pharmacological interventions to improve treatment.

Being a Centre of Excellence provides great opportunities to broaden and strengthen our cooperation, align research goals, and profit from of our complementary expertise and valuable infrastructure, as well as performing more cost-efficient research through strong leadership and an integrated approach. Further, there is a large degree of sharing of postdoctoral fellows and support personnel across different groups, and several PhD students have been co-supervised by seniors and members of different research groups at the Centre.







**Basic self-disturbances in first treated psychosis – A seven-year follow-up study**

An exploration of stability, impact on recovery and sense of coherence

Ingrid Hartveit Svendsen Mc, PhD-student

#3  
LD SOCIAL FUNCTIONING  
are naturally occurring social behaviour  
id with video ethnography

## Top Day 2020

12 June - Zoom

- 09:00 **Ole A Andreassen:** Introduction and overview of today's program
- 09:15 **Camilla B. Flaaten:** Course of intellectual and cognitive functioning in schizophrenia-spectrum and bipolar disorders: Associations with functional outcome
- 09:35 **Margrethe Collier Høegh:** Affective lability and social functioning in psychotic disorders
- 09:55 **Linn Sofie Sæther:** Neurophysiological markers of social cognition: preliminary findings from the ecoval study
- 10:15 Coffee break
- 10:30 **Maren C. Frogner Werner:** Immune markers and associations with infections, autoimmune disease and genetic risk in severe mental disorders
- 10:50 **Martina J. Lund:** Differences in directed functional connectivity related to age, sex and mental health
- 11:10 **Stener Nerland:** Cortical myelin mapping with the T1w/T2w-ratio
- 11:30 Lunch break
- 12:10 **Kristin Fjelnseth Wold:** Long term recovery and treatment resistance in first episode patients: A ten-year follow-up study
- 12:30 **Gina Åsbø:** Clinical recovery in psychotic disorders: a 10-year follow-up study
- 12:50 **Linn Nilsen Rødevand:** Overlap in genetic architecture and loci between bipolar disorder and cardiovascular disease risk?
- 13:10 Coffee break
- 13:25 **Naz Karadag:** Investigating genetic overlap between psychiatric disorders and epilepsy
- 13:45 **Daniel Roelfs:** The genetics of the functional connectome
- 14:05 Coffee break
- 14:20 **Jannicke Fjæra Andresen Laskemoen:** PhD summary; Sleep disturbances in schizophrenia spectrum and bipolar disorders
- 14:45 **Ingrid Hartveit Svendsen:** PhD summary; Anomalous self-experience in first episode psychosis

## Researcher Training

NORMENT offers a range of training and development opportunities for our PhD students, postgraduate researchers, and other research staff. About 60 PhD students and 40 postdoctoral fellows worked at or were affiliated with the Centre in 2020. During the year, there have been various meetings with the aim to provide the best possible researcher training. Scientific sharing and synergy across domains were important topics at these events and are underlying principles for all research activities at the Centre.

### PhD Education and Training of Researchers

The PhD students at NORMENT are enrolled at the mandatory PhD education programme at the University of Oslo and University of Bergen. In addition, several PhD students are members of the Norwegian Research School in Neuroscience (NRSN) which organizes courses, training, and a conference for PhD candidates in neuroscience nationwide. NORMENT is also involved in the National Research School in Bioinformatics, Biostatistics and Systems Biology (NORBIS), where PhD students and postdocs may attend courses in genetic analyses and statistics.

During 2020, NORMENT organized regular research meetings where PhD students and postdocs across research groups and scientific disciplines presented their projects, results and future plans. There were also regular workshops in academic writing and clinical supervision, as well as group meetings organized by the different research groups at the Centre where PhD students and postdocs presented their research.

The yearly **TOP Day** is also an important arena for PhD students to get training in dissemination of their research. The term "TOP" comes from the name of the main study at the Centre, the "Thematically Organized Psychosis" Study. In 2020, the TOP Day was organized as a digital meeting on June 12. After a general introduction and update by Centre leader Ole A. Andreassen, 12 PhD students from various groups and scientific backgrounds presented their research projects, to share ideas and give each other feedback on topics ranging from genes to clinical symptoms.

### Career Development

Another important aspect of the researcher training is a continuous focus on career development of early-career investigators. During 2020, the Career Development Task Force continued their work on onboarding of new employees, and relevant information was made available on the internal web pages. Each new employee at the

Centre receives a welcoming email from the administration and is being assigned a buddy to help them settle into their new position. Group leaders invite new members for a starting talk and help postdocs making a career plan and finding a mentor. An alumni night with former NORMENT colleagues was scheduled in April, but had to be postponed due to the pandemic.

NORMENT still emphasizes guiding of early stage researchers by involving them in grant writing and encouraging them to participate in the postdoctoral and mentor programme at the Universities of Oslo and Bergen. These programmes include courses in career planning, research management, and external funding. Early stage scientists may also participate in international research education and training at the University of California San Diego (UCSD) in the USA, funded in part by the Research Council of Norway (INTPART grant). During 2021, the task force is planning new meetings related to career development.



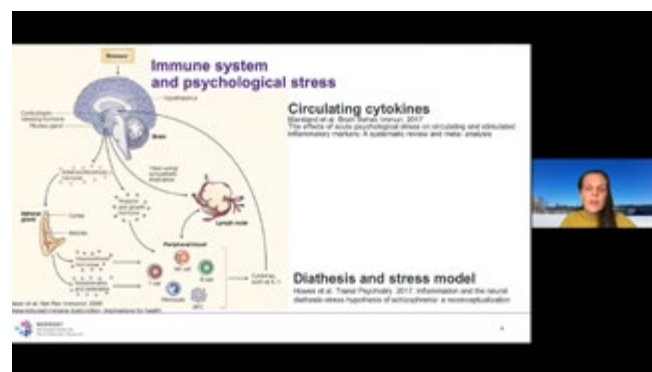
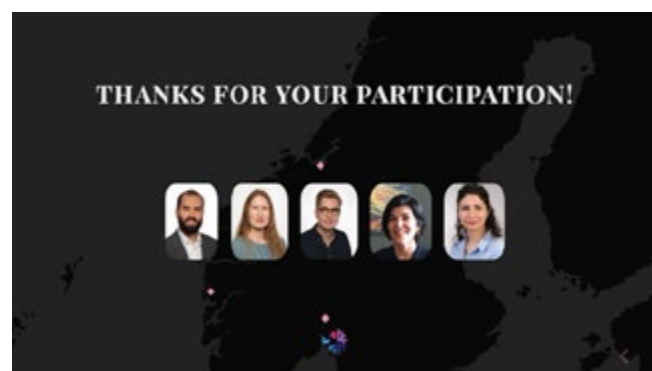
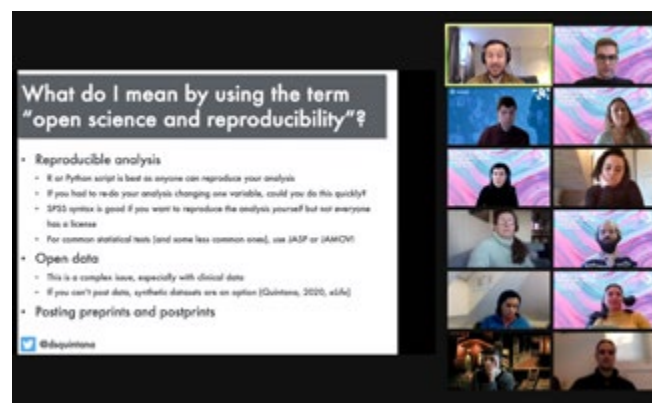
White matter microstructure across the adult lifespan: a mixed longitudinal and cross-sectional study using advanced diffusion models and brain-age prediction

Presented by: [Name]



# EARLY-CAREER RESEARCHERS MEETING

27 November 2020



## Early-Career Researchers Meeting

The Early-Career Researchers Meeting was established in 2015 as a yearly one-day meeting for PhD students, postdocs and other researchers who are at an early stage in their career. The meeting is fully planned by the early career researchers themselves and is an arena to discuss topics that they consider important to their scientific development and career.

The 2020 meeting took place on November 27 and was organized as a digital event with about 45 people attending. The title of the meeting was “Reproducibility and Open Science at NORMENT”, and the talks covered a range of topics related to promoting reproducibility and discussed open science practices within the different fields represented at the Centre.

Invited speaker **Athanasia Monika Mowinckel** discussed open-source R-packages for the analysis of brain imaging data, with examples from her work at the Center for Lifespan Changes in Brain and Cognition (LCBC) at the University of Oslo. **James Heathers**, Chief Scientific Officer at Cipher Skin in Boulder, Colorado, gave a thought-provoking talk about traditions in academia that challenge open science, as well as pitfalls in the adoption of open science practices. Selected presenters from research groups at NORMENT discussed reproducibility through the collection, analysis, and storage of data, both from clinical and basic science perspectives.

The meeting also had an interactive session featuring an open science “escape room”, adapted to a digital format for this meeting and based on a concept by Katrine Sundsbø. The escape room was very well received by the participants and provided the opportunity for more participant engagement and discussion in smaller groups even though this year’s meeting was in a digital format.

## Synergy Meetings

The Synergy Meetings are monthly meetings alternating between Oslo and Bergen, where researchers at all levels can present ideas and preliminary data to facilitate interactions and discussions. These meetings reflect NORMENT’s overall focus on “vertical synergy”, in which the aim is to obtain different levels of understanding by bringing together transdisciplinary expertise and methods. An important part of the meetings is to initiate new collaborative projects and discuss ongoing projects across the Centre. Each meeting ends with a to-do list, and the Synergy Projects lists on our internal webpages are updated.

During 2020, there were seven Synergy Meetings in total. Most meetings were digital due to the pandemic, which actually made it possible for more people to attend (60-80 participants on Zoom compared to 30-40 at physical meetings). The meetings covered broad topics such as *Biomarkers, Immunology, Prediction, Somatic comorbidity, Longitudinal data, Heterogeneity and small effects, and Illness mechanisms and translation.*

## Annual Retreat

The Annual Retreat is the main social and scientific event for everyone at NORMENT and is normally organized as a two-day meeting at a conference hotel in Oslo or Bergen. Due to the pandemic, we were forced to find alternative solutions for this year’s retreat. The meeting took place on Zoom on September 17, with more than 120 participants. Four external keynote speakers were invited to give inspiring talks of relevance for everyone at the Centre.

**Fred Gerkum**, member of the NORMENT User Council, shared a personal user perspective on bipolar disorder.

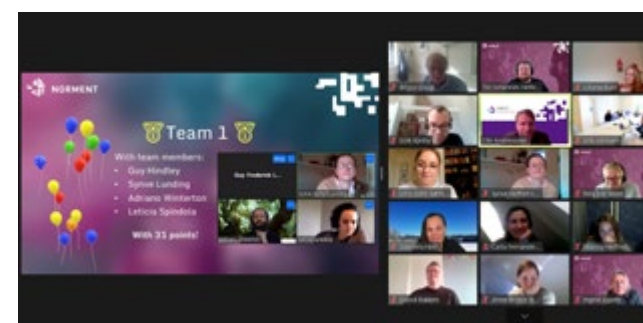
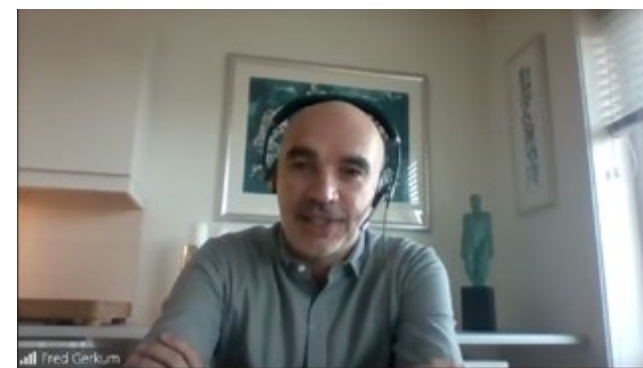
The next two talks focused on comorbidity in psychiatric disorders, which is an important topic of research at NORMENT.

**John McGrath**, director of the Queensland Centre for Mental Health Research in Australia, gave a talk on somatic comorbidity in mental illness, based on his extensive cross-disciplinary and epidemiological research on non-genetic risk factors for schizophrenia.

**Sarah Bergen**, senior researcher at Karolinska Institutet in Sweden, presented her research on comorbidities in schizophrenia research, with a focus on genetic factors.

**Bruno Goud**, director of research at the French CNRS, shared his experiences from working with multidisciplinary research.

An interactive session was also included at the meeting, to promote some informal talk and interaction across the Centre. The meeting participants were divided into smaller groups using “breakout rooms” in Zoom, and everyone solved a quiz covering a number of different topics. The quiz was great fun and highly appreciated by the participants as a way of catching up with colleagues in an informal way.



## Annual Retreat 2020

Thursday 17 September

09:00 - 09:45	<b>Ole A. Andreassen:</b> Welcome address and status of NORMENT and post-SFF phase
09:45 - 10:15	<b>Fred Gerkum, NORMENT User Council:</b> User perspective on bipolar disorder (Moderator: Ole A. Andreassen)
10:15 - 10:30	Q/A & Discussion
10:30 - 10:45	Coffee break
10:45 - 11:30	<b>John McGrath, University of Queensland, Australia:</b> Somatic comorbidity in mental illness (Moderator: Ingrid Agartz)
11:30 - 11:45	Q/A & Discussion
11:45 - 12:30	Lunch break
12:30 - 13:15	<b>Quiz</b>
13:15 - 13:30	Coffee break
13:30 - 14:15	<b>Sarah Bergen, Karolinska Institutet, Sweden:</b> Leveraging comorbidities in schizophrenia research (Moderator: Ingrid Agartz)
14:15 - 14:30	Q/A & Discussion
14:30 - 15:15	<b>Bruno Goud, Institut Curie, France:</b> How to succeed in multidisciplinary research (Moderator: Ole A. Andreassen)
15:15 - 15:30	Q/A & Discussion
15:30 - 15:45	<b>Ole A. Andreassen:</b> Conclusive remarks and announcement of quiz winner





## PhD Dissertations in 2020

4 PhD students at NORMENT defended their doctoral thesis during 2020:



**Priyanthi Borgen Gjerde:**  
Lipid effects during antipsychotic drug treatment and their relevance for clinical outcomes.  
Supervisor: Vidar M. Steen, January 29, 2020



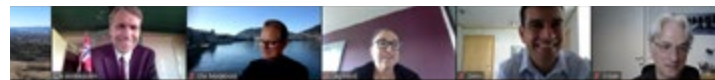
**Ibrahim Akkouh:**  
Transcriptional Modeling of Severe Mental Illnesses.  
Supervisor: Srdjan Djurovic, May 6, 2020



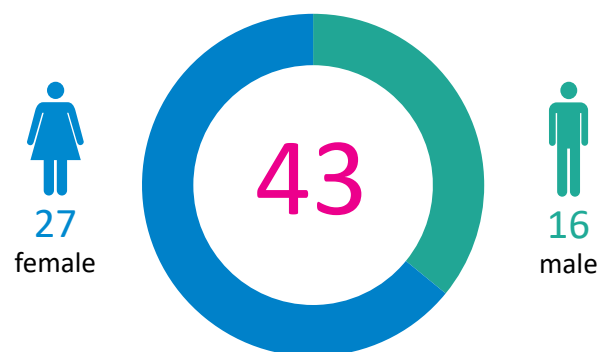
**Eirik Kjelby:**  
Depressive symptoms in psychotic disorders: Trajectories of depression and antidepressive effectiveness of antipsychotic medication.  
Supervisor: Erik Johnsen, October 16, 2020



**Tone Elise Gjøtterud Henriksen:**  
Blue-blocking glasses as adjunctive treatment for bipolar mania - and exploration of motor activity patterns in serious mental disorders.  
Supervisor: Anders Lund, October 23, 2020.



43 people have so far completed their PhDs at the Centre



## PhD Dissertations 2016-2019

(2013-2015 dissertations can be found in the [2018 Annual Report](#))

### 2016

**Ingeborg Bolstad:** Effects of aripiprazole vs haloperidol on brain activity in healthy volunteers, supervisor: Jimmy Jensen, March 8, 2016

**Christine Lycke Brandt:** Brain networks in psychotic disorders: A neuroimaging study of working memory related activation, connectivity and anatomy, supervisor: Lars Tjelta Westlye, June 13, 2016

**June Ullevoldsæter Lystad:** Neurocognition, cognitive remediation and functional outcome in schizophrenia spectrum disorders, supervisor: Torill Ueland, December 12, 2016

### 2017

**Kristina Skåtun:** Abnormal brain connectivity in schizophrenia and bipolar disorder – a resting state functional MRI study, supervisor: Lars T. Westlye, January 19, 2017

**Mari Nerhus:** Migration and Vitamin D in psychotic disorders – A cross sectional study of clinical and cognitive correlates, supervisor: Ingrid Melle, March 3, 2017

**Marit Haram:** The relationship between oxytocin pathway genes and personality traits and psychosis characteristics, supervisor: Martin Tesli, June 1, 2017

**Kjetil Nordbø Jørgensen:** Understanding brain structure alterations in severe mental disorders: The influence of cigarette smoking, antipsychotic medication and weight gain, supervisor: Ingrid Agartz, June 20, 2017

**Beathe Haatveit:** Executive functioning in schizophrenia spectrum disorders: Methods of measurement and longitudinal course, supervisor: Torill Ueland, August 22, 2017

**Lynn Mørch-Johnsen:** Brain structure imaging of apathy and auditory hallucinations in psychotic disorders, supervisor: Ingrid Agartz, December 1, 2017

**Tiril Østefjells:** Metacognition in severe mental disorders, supervisor: Jan Ivar Røssberg, December 7, 2017

**Levi Kvitland:** Cannabis use in the early phase of bipolar disorder. A naturalistic longitudinal study of a first treatment sample, supervisor: Petter Andreas Ringen, December 8, 2017

### 2018

**Ragni Mørch:** Inflammatory pathways in severe mental disorder – a transdiagnostic approach, supervisor: Ole A. Andreassen, May 15, 2018

**Erlend Strand Gardsjord:** Subjective quality of life in first episode psychosis - A 10-year follow-up study, supervisor: Jan Ivar Røssberg, September 20, 2018

**Niladri Banerjee:** An evolutionary epigenetics approach to schizophrenia, supervisor: Stephanie Le Hellard, September 28, 2018

**Christine Demmo:** Neurocognitive functioning, clinical course and functional outcome in the early phase of bipolar I disorder: A prospective longitudinal study, supervisor: Torill Ueland, October 25, 2018

### 2019

**Nathalia Zak:** A longitudinal investigation of cortical plasticity and structure in bipolar disorder type II, supervisor: Torbjørn Elvsåshagen, May 13, 2019

**Trude Jahr Vedal:** The side effect burden of antipsychotic drugs - A naturalistic study with focus on metabolic disturbance, supervisor: Erik G. Jönsson, May 31, 2019

**Saurabh Srinivasan:** A Polygenic Enrichment Approach to Human Evolution in Schizophrenia and Cognitive Function, supervisor: Ole A. Andreassen, June 13, 2019

**Gerard Dwyer:** New approaches to the use of magnetic resonance spectroscopy for investigating the pathophysiology of auditory-verbal hallucinations, supervisor: Renate Grüner, October 9, 2019

**Runar Elle Smelror:** Cognitive and clinical characteristics in adolescent non-affective early-onset psychosis and healthy controls, supervisor: Ingrid Agartz, November 8, 2019

**Geneviève Richard:** Identifying markers of brain health and plasticity: A neuroimaging and behavioral study of cognitive aging and cognitive training following stroke, supervisor: Lars T. Westlye, November 11, 2019

**Linn Norbom:** The illumination of the developing brain, Using MRI signal intensity contrasts to probe microstructural brain maturation, and associations with psychopathology and cognition, supervisor: Christian K. Tamnes, November 28, 2019

**Farivar Fathian:** C-reactive protein in schizophrenia-spectrum disorders; relationship to cognitive functions and medications, supervisor: Erik Johnsen, December 5, 2019

**Luigi Maglanoc:** Elucidating depression heterogeneity using clinical, neuroimaging and genetic data, supervisor: Lars T. Westlye, December 6, 2019

# International Collaboration

The research at NORMENT requires close cooperation with leading research environments, both nationally and internationally. Researchers at the Centre collaborate with a large number of researchers abroad ([see page 58](#)), participate in a series of international networks and consortia ([see page 59](#)), and have several bilateral research programs with international institutions, mainly in Europe and the USA. During the years, our international collaborations have resulted in a number of important scientific findings. NORMENT also actively recruits excellent researchers from other countries through international advertisements and networking, and as a result the Centre staff now consist of people from 29 nationalities.

We participate in several working groups of the Enhancing Neuro Imaging Genetics Through Meta Analysis (ENIGMA) consortium. Ole A. Andreassen chairs the Bipolar Disorder Working Group and the CNV Working Group (Ida Sørnderby is co-chair), while Ingrid Agartz chairs the Early Onset Psychosis Working Group.

As part of this consortium in 2020, Tiril Gurholt was leading author on a study that characterized the pattern of subcortical brain change in adolescent early-onset psychosis (Human Brain Mapping), while Unn Haukvik headed a study on in vivo hippocampal subfield volumes in bipolar disorder (Human Brain Mapping).

We also contributed to a number of other ENIGMA studies on bipolar disorder (Ching et al., Human Brain Mapping, Nunes et al. Mol Psychiatry), major depressive disorder (Han et al., Molecular Psychiatry; Leerssen et al., Translational Psychiatry), and schizophrenia (Holleran et al., American Journal of Psychiatry).

Another important international network is the Psychiatric Genomics Consortium (PGC). We are particularly involved in the PGC Bipolar Disorders (Ole Andreassen is chair), Schizophrenia (Kamitaki et al., Nature; Richards et al. Schizophr Bulletin), and the Cross Disorder Working Groups, as well as contributing with analytical expertise and data to several working groups.

Researchers at the Centre are also involved in a prestigious EU project coordinated by NORMENT, and three INTPART projects funded by the Research Council of Norway ([see pages 56-57](#)).

## Guest Researchers

Two international guest researchers had part-time positions at NORMENT in 2020 and collaborated closely with researchers at the Centre. Professors **Anders M. Dale** and **Wesley Thompson** from the University of California San Diego, USA, contributed with knowledge and analyses, participated in project discussions, and were involved in planning of future studies with our researchers.

Unfortunately, due to the pandemic, our guest researchers were not able to visit the Centre in 2020, but we had extensive interactions on Zoom meetings.

## Visits abroad

As part of our international collaboration, we emphasize the mobility of PhD students, postdoctoral fellows and senior scientists exchanged with a diversity of countries. Due to the pandemic, the mobility of NORMENT employees drastically declined in 2020. Conferences and planned visits had to be cancelled or postponed. However, some were able to travel in the months prior to the lockdown.

From January to March, PhD student **Henrik Myhre Ihler** visited Professor Bruno Etain at the Institut national de la santé et de la recherche médicale (INSERM) in France, to learn about actigraphy as part of an INTPART collaboration.

Postdoc **Ann-Marie de Lange** spent the whole year at the Department of Psychiatry at the University of Oxford, using an overseas mobility grant from the South-Eastern Norway Regional Health Authority and a mobility grant from the Research Council of Norway.

Postdoc **Francesca Puppo** also stayed abroad in 2020, to continue working with stem cells research in the lab of Anna Devor at the University of California in San Diego, USA.

Several people also had shorter stays abroad up to March 2020, to discuss collaborative projects and participate in project meetings. Some examples are shown below:

**Ingrid Agartz** visited collaborators at Karolinska Institutet, Sweden, every other week up to March 2020 to discuss schizophrenia research.

**Dag Alnæs** visited Douglas D. Garret at the Lifespan Neural Dynamics Group, Max Planck UCL Centre for Computational Psychiatry and Ageing, Max Planck Institute for Human Development, Berlin, Germany for research collaboration.

**Ole Andreassen** visited the University of California, San Diego and the University of Southern California in Los Angeles on different occasions for research collaboration.

**Oleksandr Frei** visited the Center for Computational and Data-Intensive Science and Engineering, Skoltech, Russia, in February to collaborate on BigData approaches in genetics and brain imaging of complex human disorders.

**Dennis van der Meer** visited the Brain Behavior Unit at the University of Cape Town, South Africa, as part of an INTPART collaboration.

## Visits from abroad

Another part of our international involvement is to host students from European countries for internships and training. In 2020, **Sophia Pieschnik**, masters student from the University of Oldenburg, Germany, **Line Kruse**, masters student from Aarhus University, Denmark, and **Hannah Oppenheimer** from the University of Constance, Germany, visited the Multimodal Imaging group as interns. In addition, **Romain Ickick** from INSERM, Paris, was a visiting researcher for three months as part of our INTPART collaboration with Paris ([see page 57](#)).

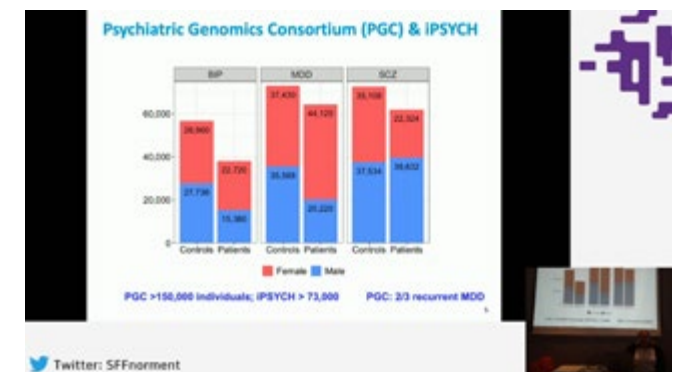
During a normal year, we would have had regular visits from international researchers coming for project meetings, collaborative discussions and to give guest lectures. Most of these visits had to be postponed due to the pandemic. Some digital guest lectures are mentioned below:

**Gabriëlla Blokland** from the School for Mental Health and Neurosciences in the Netherlands held a guest lecture on sex differences in the genetics of mental disorders in January.

**Liyuan Zhang** from the Department of Psychiatry, Zhengzhou University in China, held a guest lecture on “Gene environment interaction: Gut microbial diversity modulate effect of genetics in the risk of schizophrenia” on November 6.



Romain Ickick presenting at the Zoom House meeting.



Gabriëlla Blokland giving a lecture at the Oslo offices.



## EU project: CoMorMent - Investigating comorbid mental illness and cardiovascular disease

In 2020, a prestigious EU project started up which is led and coordinated by NORMENT and the University of Oslo. The CoMorMent project is funded by the EU Horizon 2020 programme with 6 million Euros for 4 years and will investigate how and why mental illness interacts with cardiovascular disease. Comorbid mental and physical health has increasingly become a focus area of the research at NORMENT and was also a highlighted topic of this year's Annual Retreat.

CoMorMent consists of four academic partners, three industry partners and one health-care partner, thus bringing together an international team of experts from the fields of human genetics and genomics, mental ill-health, cardiovascular disease and phenotyping and bioinformatics.

The project will take on a big data approach, using information from 1.8 million volunteers from across Northern Europe, with the aim to identify the genetic, brain and body markers that are common in both cardiovascular and mental health conditions. These markers will give clues about the underlying causes and long-term outcomes of having both conditions (comorbidity). By unmasking the underlying causes of these conditions, the aim is further to develop clinical tools that will help doctors identify patients who are in a high risk of developing comorbid cardiovascular disease and mental ill-health, and give them tools to diagnose and monitor these patients.

The following partners are involved:

- NORMENT/University of Oslo, Norway
- Islensk Erfdagreiing EHF, Iceland
- Region Hovedstaden, Denmark
- Karolinska Institutet, Sweden
- University of Edinburgh, UK
- Tartu Ulikool, Estonia
- Multimodal Imaging Services Corporation, dba HealthLytx, USA
- Amra Medical AB, Sweden



Pictures from the CoMorMent kick-off meeting in Oslo on January 27, 2020.

## INTPART projects

INTPART is a research programme for International Partnerships for Excellent Education, Research and Innovation, and promotes the development of long-term relations between Norwegian higher education and research institutions and strong research groups and institutions in priority partner countries. As part of this programme, we have collaborations with researchers in South Africa (Cape Town), France (Paris), and USA (San Diego).

### INTPART South Africa: Integrating global mental health with brain imaging and genetics in mental illness research and education

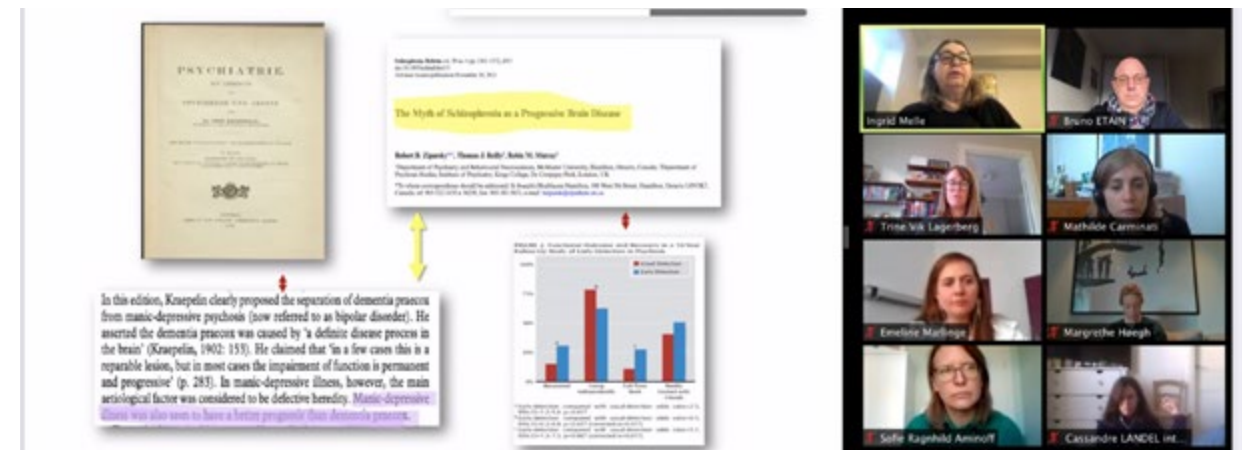
This collaborative project including NORMENT and the University of Cape Town started in 2018. The main purpose of the project is to combine and integrate mental health research across sites and to educate researchers in modern imaging, genetic tools and transcultural clinical expertise. Principal investigators are professor **Ole A. Andreassen** at NORMENT and professor **Dan Stein**, head of the Brain Behaviour Unit at the University of Cape Town.

During 2020, the collaboration with Cape Town mainly consisted of regular digital meetings and updates. We have started writing up the results of several collaborative projects, and the first report is published with PhD student **Mary Mufford** as first author.

### INTPART France: Improving clinical services in bipolar disorder through education and research on illness mechanisms

The project started in 2019 and builds on a long-term collaboration between researchers at NORMENT and INSERM/University of Paris. The current project focuses on clinical aspects of bipolar disorder, and the main aims are to provide better integration of research and clinical services, investigate early illness phases while providing front-line treatment, using new digital tools in data collection and clinical intervention, and to investigate underlying illness mechanisms including circadian rhythms and lithium response. Principal investigators are senior researcher **Trine Vik Lagerberg** at NORMENT and professor **Bruno Etain** from INSERM and the University of Paris.

**Henrik Myhre Ihler**, PhD candidate at NORMENT, was a visiting researcher in Paris from January to March. **Romain Ickick**, post doc from Paris, visited Oslo from August to November in 2020.

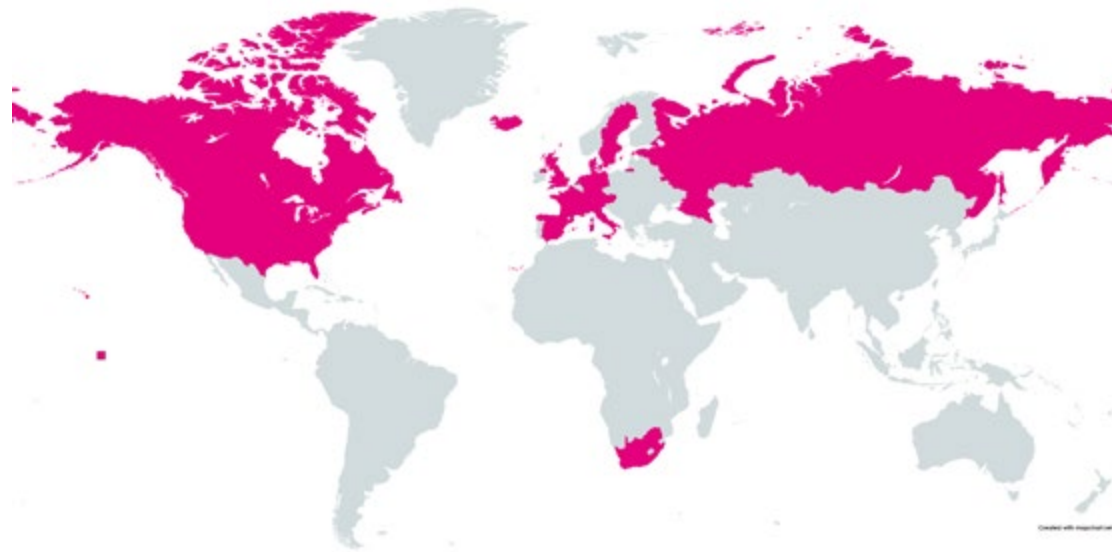


Screenshot from a digital INTPART France meeting.

### INTPART USA: Simulating the multi-scale pathophysiology of mental illness

NORMENT has collaborated closely with researchers at the University of California, San Diego for several years. The current INTPART project started in 2019 and is an extension of this collaborative effort, now focusing on multidisciplinary neuroscience. The primary objective is to enhance the existing interdisciplinary synergy between sites, improve tools and approaches for understanding mental disease, and educate translational researchers to address questions that require integration of big data (genomics) with clinical measurements of function. This project is headed by the Simula Research Laboratory in Oslo, and also includes the Centre for Integrative Neuroplasticity (CINPLA) at the University of Oslo.

During the first months of 2020, **Ole A. Andreassen** visited San Diego for project discussions. This involved plans for new analytical methods and publications, as well as strategy for new collaborative grants and postdoc exchanges.



## International Collaborators

### Nordic Countries

#### Denmark

- Christian Gerlach, Professor, University of Southern Denmark, Odense
- Randi Starrfelt, Professor, University of Copenhagen
- Thomas Werge, Professor, iPSYCH and Mental Health Centre Sct. Hans, Copenhagen

#### Iceland

- Hreinn Stefansson, Head of CNS Department, deCODE genetics, Reykjavik
- Kari Stefansson, CEO deCODE Genetics, Reykjavik
- Kristinn Johnsen, Director, Mentis Cura, Reykjavik
- Unnur Valdimarsdottir, University of Iceland, Karolinska Institutet, Sweden

#### Sweden

- Anna Falk, Assoc. Professor, Karolinska Institutet, Stockholm
- Göran Engberg, Professor, Karolinska Institutet, Stockholm
- Hannes Bohman, Uppsala University
- Henrik Zetterberg, University of Gothenburg
- Kaj Blennow, Professor, University of Gothenburg
- Lars Farde, Professor, Karolinska Institutet, Stockholm
- Lars Nyberg, Professor, University of Umeå
- Mathias Lundberg, Uppsala University
- Mikael Landén, Professor, University of Gothenburg
- Patrick F. Sullivan, Professor, Karolinska Institutet, Stockholm
- Simon Cervenka, Assoc. Professor, Karolinska Institutet, Stockholm
- Sophie Erhardt, Professor, Karolinska Institutet, Stockholm
- Susanna Radovic, Assoc. Professor, University of Gothenburg

### Europe

#### Austria

- Maria Rettenbacher, Assoc. Professor, Medizinische Universität Innsbruck, Innsbruck
- W. Wolfgang Fleischhacker, Professor, Medizinische Universität Innsbruck

#### Estonia

- Lili Milani, University of Tartu, Estonian Genome Center

#### France

- Bruno Etain, Senior Scientist, Hôpital Henri Mondor-Chenevier, Creteil
- Chantal Henry, Professor, Hôpital Henri Mondor-Chenevier, Creteil
- Frank Bellivier, Professor, Université Denis Diderot, Paris
- Romain Icick, MD, PhD, Institut Pasteur, Paris, France

### Germany

- Andreas Meyer-Lindenberg, Professor, University Medical Centre Mannheim
- Douglas Garrett, Senior Researcher, Max Planck Institute for Human Development, Berlin
- Emanuel Schwarz, Research Associate, Central Institute of Mental Health, Mannheim
- Falk Kiefer, Professor, Central Institute of Mental Health, Mannheim
- Franziska Degenhardt, Principal Investigator, Kliniken und Institut der Universität Duisburg-Essen
- Marcella Rietschel, Professor, Central Institute of Mental Health, Mannheim
- Markus Nöthen, Professor, University of Bonn
- Michael Peitz, Professor, University of Bonn
- Peter Falkai, Dept of Psychiatry and Psychotherapy, LMU Munich
- Tania Lincoln, Professor, Hamburg University
- Thomas G. Schülz, Institute of Psychiatric Phenomics and Genomics, LMU Munich
- Vadim V. Nikulin, Principal Investigator, Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig

### Italy

- Alessandro Bertolino, Professor, University of Bari
- Armida Mucci, Assoc. Professor, University of Naples
- Francesco Benedetti, Director, San Raffaele Scientific Institute, Milan
- Mirko Manchio, Ass Prof, Section of Psychiatry, Department of Medical Sciences and Public Health, University of Cagliari
- Patrizia Capolongo, Professor, University of Roma
- Silvana Galderisi, Professor, University of Naples

### Netherlands

- Andre Aleman, Professor, Groningen UMC
- Andre Marquand, Donders Institute
- Danielle Posthuma, Professor, Vrije Universiteit, Amsterdam
- Dirk J. A. Smit, Amsterdam UMC
- Dirk Schubert, Professor, Utrecht University Medical Center
- Iris Sommer, Professor, Utrecht University Medical Center
- Marie-Josè van Tol, Senior Scientist, University of Groningen
- Vivi Heine, Professor, Vrije Universiteit, Amsterdam

### Spain

- Eduard Vieta, Professor, Hospital Clinic, Institute of Neuroscience, University of Barcelona, Barcelona, Catalonia
- Mazahir Hasan, Research Professor, Achucarro Basque Center for Neuroscience, Bilbao
- Miguel Lopez, Senior Research Scientist, University of Santiago de Compostela

### Switzerland

- Ahmad Abu-Akel, Professor, University of Lausanne
- Narly Golestani, Professor, University of Geneva
- Stefan Borgwardt, Professor, University of Basel
- Stefan Kaiser, Professor, University of Geneva
- Sven Cichon, Professor, University of Basel

### United Kingdom

- Adrian J. Harwood, Professor, Cardiff University
- Allan Young, Institute of Psychiatry, Psychology & Neuroscience, King's College London
- Andrew MacIntosh, Professor, University of Edinburgh
- Angela Vincent, Professor Emeritus, University of Oxford
- Clara Strauss, Honorary Senior Lecturer, Sussex University, Brighton
- Guy Goodwin, Professor em, University of Oxford
- Gwenaëlle Douaud, Assoc. Professor, University of Oxford
- Ian Apperly, Professor, University of Birmingham
- James Walters, Professor, Cardiff University
- Michael O'Donovan, Professor, Cardiff University
- Stephen Smith, Professor, Oxford University

### USA

- Anders M. Dale, Professor, UCSD, San Diego
- Anna Devor, Associate Professor, UCSD, San Diego
- Elizabeth Bromley, Associate Professor, Semel Institute for Neuroscience and Human Behavior, UCLA, Los Angeles
- Hauke Bartsch, USCD, San Diego
- John Kelsoe, Professor, UCSD, San Diego
- Jordan Smoller, Professor, Harvard Medical School, Boston
- Joseph Ventura, Professor, UCLA, Los Angeles
- Judith M. Ford, Professor, Laboratory of Clinical and Cognitive Neuroscience, UCSF, San Francisco
- Kathleen Merikangas, Professor, National Institute of Mental Health, Bethesda
- Kent Kiehl, Professor, University of New Mexico
- Kerry Ressler, Professor, McLean Hospital, Harvard Medical School, Boston
- Kristen Brennand, Associate Professor, Division of Molecular Psychiatry, Yale University
- Melvin McInnis, Professor, University of Michigan
- Michael McCarthy, Associate Professor, UCSD, San Diego
- Ofer Pasternak, Associate Professor, Harvard Medical School, Boston
- Patrick Sullivan, Professor, University of North Carolina of Chapel Hill, Chapel Hill
- Paul Thompson, Professor, UCLA, Los Angeles
- Rene Kahn, Professor, Icahn School of Medicine at Mount Sinai, New York
- Robert H. Yolken, Professor, Johns Hopkins School of Medicine, New York
- Steven Dilsaver, El Centro
- Susan McGurk, Professor, Boston University
- Wesley Thompson, Associate Professor, UCSD, San Diego
- William Horan, Senior Scientist, UCLA, Los Angeles
- Chi-Hua Chen, Associate Professor, UCSD, San Diego

### Other Countries

#### Canada

- Lakshmi Yatham, Professor, Department of Psychiatry, University of British Columbia, Vancouver
- Sheilagh Hodgkins, professor, University of Montreal
- Stephen Hart, Professor, Simon Fraser University, Burnaby

#### Russia

- Maya Kulygina, Senior Researcher, V. Serbsky National Research Centre of Psychiatry and Narcology, Moscow
- Oleg Papsuev, MD, PhD, V. Serbsky National Research Centre of Psychiatry and Narcology, Moscow

#### South Africa

- Dan Stein, Professor, University of Cape Town

## International Projects and Consortia

- [Bergen Global Mental Health Research Group](#)
- BRAINCHART: Normative brain charting for predicting and stratifying psychosis
- [Brainstorm Consortium](#)
- [CHARGE - Cohorts for Heart and Aging Research in Genomic Epidemiology](#)
- [COGENT - Cognitive Genomics Consortium](#)
- [COMMITMENT - COMorbidity Modeling via Integrative Transfer machine-learning in MENTAL illness](#)
- [CoMorMent – Predicting comorbid cardiovascular disease in individuals with mental disorder by decoding disease mechanisms \(EU Horizon 2020\)](#)
- [COST Action CA17130 – Enhancing Psychiatric Genetic Counselling, Testing, and Training in Europe \(EnGage\)](#)
- [COST-MINDDS- Maximising Impact of Research in NeuroDevelopmental Disorders](#)
- [ECNP Bipolar Disorder - European College of Neuropsychopharmacology Bipolar Disorders Network](#) Ole A. Andreassen chairs the Bipolar Disorder Network
- [ECNP Schizophrenia - European College of Neuropsychopharmacology Schizophrenia Network](#)
- [ENIGMA - Enhancing Neuro Imaging Genetics Through Meta Analysis](#) Ole A. Andreassen chairs the Bipolar Disorder Working Group and the CNV Working Group (Ida Sönderby is co-chair), Ingrid Agartz chairs the Early Onset Psychosis Working Group (Tiril Gurholt is co-chair)
- EURICND - European IPSC Consortium for Neuropsychiatric Disorders: Srdjan Djurovic chairs the consortium
- [EuroNES - European Negative Symptoms Research Network](#)
- [GEMRIC – The Global ECT-MRI Research Collaboration](#) Leif Olteidal coordinates the collaboration
- [GenECTic - Genomics of ECT-international consortium](#)
- [HVN - Hearing Voices Network](#)
- [ICHR - International Consortium on Hallucination Research](#)
- [IMAGEMEND - Imaging Genetics for Mental Disorders](#)
- [KaSP - Karolinska Schizophrenia Project](#)
- [MINDDS - Maximising Research Impact in Neurodevelopmental Disorders](#)
- [PGBD – Pharmacogenomics of Bipolar Disorder](#)
- [PGC - Psychiatric Genomics Consortium](#) Ole A. Andreassen chairs the Bipolar Disorder Working Group
- [PsychDPC - Psychiatric Diagnostic and Prevention Consortium](#)
- [R-LiNK - Optimizing Response to Lithium Treatment through Personalized Evaluation of Individuals with Bipolar I Disorder](#)
- [STRATA-G – Schizophrenia: Treatment Resistance and Therapeutic Advances - Genetics](#)
- [TRYGGVE 2 – Nordic collaboration for sensitive data](#)



NORMENT - Norsk senter for forskning på mentale lidelser  
@sffnorment

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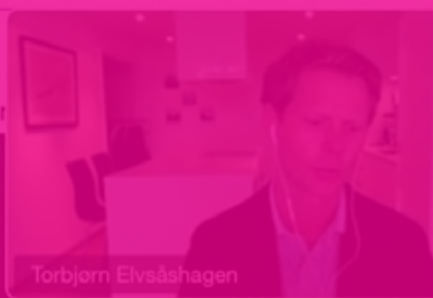


## Nervecellenes koblinger



- Hjernen: -80-100 milliarder nerveceller
- Nervecellen: 5.000-50.000 koblinger til andre nerveceller, kalles også synapser
- Nervecellens oppgave: motta, bearbeide og videregående informasjon
- Det er ved hjelp av koblingene nervecellene mottar og videregående informasjon
- Koblingene avgjørende for læring og hukommelse
- Koblingene viktig for regulering av humør og tankeinnhold

Figurer fra US Nation



Torbjørn Elvsåshagen

## Dissemination and Communication

Dissemination is an important part of research. At NORMENT, we have a continuous focus on communicating our findings, not only to other researchers through publications in scientific journals and presentations at scientific conferences and meetings, but also to patient organizations, health personnel, and the general public.

The Covid-19 pandemic affected our dissemination activities, particularly due to cancelled international congresses. However, we managed to keep up the scientific production and also present our research at several virtual conferences and meetings, as well as giving talks to health personnel and organizing digital events for the public.

We use our [website](#) to share news and events, and researchers at the Centre contribute with texts about their research ("Månedens forsker") to reach out to a broader audience.

[Twitter](#) is used to share news about publications, meetings, thesis defences, and other information related to science and mental disorders. At the end of 2020, NORMENT had about 800 followers on Twitter (increasing from 600 in 2019).

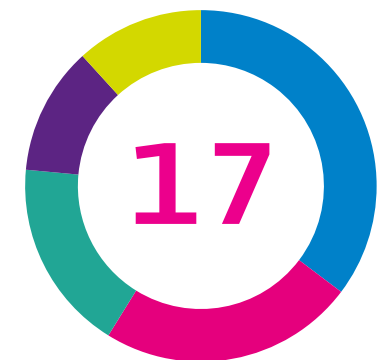
We have also been on [Facebook](#) since March 2019. Our Facebook page is mainly targeted towards users, health personnel and the general public, and is mainly administrated by the User Representative. We actively use Facebook to share news and events from the Centre. More than 800 people are now following us on Facebook (increasing from 500 in 2019).

In December 2020, we launched the first NORMENT newsletter, targeted towards health personnel, research participants and the general public. The aim is to send out quarterly newsletters with information about research news, events and activities at the Centre, focusing on the applicability of our research. More than 200 people are already subscribing to the newsletter.

A selection of our dissemination activities in 2020 are listed on the following pages.

- 171** Publications in scientific journals
- 53** International scientific presentations (36 oral presentations, 17 posters)
- 16** National scientific presentations (16 oral presentations, 0 posters)
- 44** Oral presentations for patient organizations and health personnel
- 14** Oral presentations and other activities for the general public
- 43** News articles, interviews and feature articles in the media
- 4** Public events

- WCPG (6)
- SIRS (4)
- SOBP (3)
- ISBD (2)
- OHBM (2)



### Poster presentations at international scientific conferences

WCPG: World Congress of Psychiatric Genetics  
SIRS: Schizophrenia International Research Society Conference  
SOBP: Society of Biological Psychiatry  
ISBD: International Society for Bipolar Disorders  
OHBM: Organization for Human Brain Mapping

## Scientific Conferences and Meetings

### Selected International Oral Presentations

**Agartz, Ingrid:** Intracranial Volume and Subcortical Structures in Adolescents with Early-onset Psychosis: A Mega-Analysis from the ENIGMA Early-onset Psychosis Working Group, EPA, Madrid, June, 2020 (digital).

**Andreassen, Ole:** Big data in bipolar disorders to clinical impact, Milken Institute, Washington DC, February 4, 2020.

**Andreassen, Ole:** The Psychiatric Genomics Consortium Bipolar Disorder Working Group: Recent Findings from Large-Scale Genetic Studies of Bipolar Disorder, ISBD, Chicago, June 18, 2020 (digital).

**Andreassen, Ole:** Updates from the PGC Bipolar disorder Working Group, WCPG Milan, October, 2020 (digital).

**Andreassen, Ole:** The emerging pattern of shared polygenic architecture of psychiatric disorders - conceptual and clinical implications, "Victor Babeş" National Institute of Pathology, Annual Scientific Meeting, November 6, 2020

**Andreassen, Ole:** How big data and new technology can transform our understanding of mental disorders – with clinical impact, Brain Conference, Moscow, November 18, 2020 (digital).

**Barth, Claudia:** Women's brain aging: effects of sex-hormone exposure, pregnancies, and genetic risk for Alzheimer's disease, Women's Brain Health Young Investigators Symposium, Vancouver, Canada, May 12, 2020 (digital).

**de Lange, Ann-Marie:** Brain ageing patterns linked to history of childbirths - Women's Brain Health Conference Young Investigators Symposium, Vancouver, Canada, May 20, 2020 (digital).

**de Lange, Ann-Marie:** Women's brain health - findings and future plans, Invited talk, Jacobs Lab, Neuroscience Research Institute, UC Santa Barbara, 2020 (digital).

**Fernandez, Sara:** Memory function in Alzheimer's Disease is selectively predicted by degenerative spreading from basal forebrain to medial temporal lobes. Advances in Alzheimer's and Parkinson's Therapies - An AAT-AD/PD Focus Meeting, March 2020 (digital).

**Frei, Oleksandr:** Cross-Trait Genetic Analysis with Bivariate Causal Mixture Model (MiXeR), WCPG, October 22, 2020 (digital).

**Granerud, Guro:** N400 Compared Between Adults With and Without High Functioning Autism, Association for Behavioral Analysis International 46th Annual Convention, USA, May 5, 2020 (digital).

**Kaufmann, Tobias:** Neurogenetics of psychiatric disorders, International Society for Neuroimaging in Psychiatry,

November, 2020 (digital).

**Lund Pedersen, Mads:** Models of action selection: The Drift Diffusion Model, Computational Psychiatry Course, Zurich, Switzerland, September 11, 2020 (digital).

**Melle, Ingrid:** Unmet Needs in the Treatment of Schizophrenia, symposium presentation, ECNP, Vienna, Austria, September 12, 2020 (digital).

**Melle, Ingrid:** Highlights in Prevention in Mental Disorders, invited oral presentation, ECNP, Vienna, Austria, September 14, 2020 (digital).

**O'Connell, Kevin:** Genetic Associations with Bipolar Disorder in Large and Ancestrally Diverse Population Samples, World Congress of Psychiatric Genetics, October, 2020 (digital).

**Olteidal, Leif:** Symposium speaker at GEMRIC: The Global ECT-MRI Research Collaboration. EPA, Madrid, Spain, March 28-31, 2020 (digital).

**Olteidal, Leif:** Global collaboration to study brain changes after ECT - current findings and future prospects. 4th European Conference of Brain Stimulation in Psychiatry, Nijmegen, The Netherlands, November 12-14, 2020 (digital).

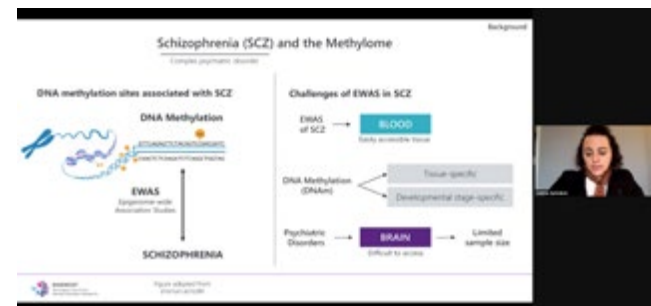
**Quintana, Daniel:** Transparent meta-analysis, (In)credible Research conference, Berlin, Germany, October 29, 2020 (digital).

**Quintana, Daniel:** Improving the credibility of meta-analysis, Animal Behavior Society 2020 meeting, July 30, 2020 (digital).

**Quintana, Daniel:** Synthetic data: A primer, Riot Science Club, June 30, 2020 (digital).

**van der Meer, Dennis:** Imaging genetics tools, Radboud University brainstorm meeting, Nijmegen, Netherlands, January 21, 2020.

**Villar, Jonelle:** Identification of differential DNA methylation associated with antipsychotic drugs, Genomics of Brain Disorders 2020, Hinxton, UK, March 18-20, 2020 (selected for lightning talk, cancelled due to Covid-19).



**Spindola, Leticia:** Exploration of brain-heritable methylation in schizophrenia cases and controls, WCPG, October 19, 2020 (digital).

**Wolfers, Thomas:** ETH computational psychiatry lecture series, Zurich, Switzerland, October, 2020 (digital).

**Wolfers, Thomas:** Workshop for NORA The Norwegian network for artificial intelligence, Oslo, Norway, November, 2020 (digital).

### Selected International Poster Presentations

**Andreou, Dimitrios:** Cytomegalovirus Exposure and IQ in Patients with Severe Mental Illness and Healthy Individuals, SOBP, New York, USA (conference cancelled, abstract published in Biological Psychiatry).

**Barth, Claudia:** Effects of hormone exposure and APOE genotype on brain aging in 16,854 UK Biobank women. OHBM, Montreal, Canada, July, 2020 (E-poster).

**Bell, Christina:** Disentangling violence: Amygdala nuclei volumes in psychosis and psychopathy, SOBP, April 30, 2020 (E-poster).

**Brunstad, Solveig:** Linking severe mental disorders to childhood trauma at an epigenetic level, WCPG, October 19, 2020 (E-poster).

**Drosos, Petros:** Trajectories and predictors of outcome in schizophrenia: the beneficial role of amisulpride, SIRS, April, 2020 (E-poster).

**Gurholt, Tiril:** Large-scale body-brain mapping reveals distinct gray matter profiles linked to body morphology, OHBM, June 25, 2020 (E-poster).

**Jakobsen, Petter:** Applying Machine Learning in Motor Activity Time Series of Depressed Bipolar and Unipolar Patients, ISBD, Chicago, USA, June 19, 2020 (E-poster).

**Maximov, Ivan:** Big data and Machine Learning in Neuroimaging: Could we predict a disorder? 3rd Advanced Course on Data Science & Machine Learning, Siena, Italy, July 13-17, 2020 (E-poster).

**Stabell, Lena:** Amisulpride provided best effect on insight over time, SIRS, April 4-8, 2020 (E-poster).

**Stavrum, Anne-Kristin:** Epigenetic Effects of THC and CBD in Neuronal Stem Cells, WCPG, October, 2020 (E-poster).

**Storvestre, Guttorm B:** Is early debut of substance use associated with violent offending in schizophrenia? SIRS, April, 2020 (E-poster).

**Sønderby, Ida Elken:** ENIGMA-CNV and other initiatives to understand the impact of rare copy number variants on brain structure and other measures, WCPG, October 19, 2020 (E-poster).

**Tesli, Natalia:** Hippocampal subfield and amygdala nuclei volumes in schizophrenia patients with a history of violence, SOBP, New York, USA, April, 30, 2020 (E-poster).

**Villar, Jonelle:** Antipsychotic drugs for psychosis: general and specific differential DNA methylation following treatment, 2020 WCPG, October 16-22, 2020 (E-poster).

### Selected National Oral Presentations

**Agartz, Ingrid:** Kan antipsykotika påvirke hjernestruktur? Gardermokurset i biologisk psykiatri, November 11, 2020 (digital).

**Andreassen, Ole:** How big data and new technology transform our understanding of mental disorders with potential for clinical impact, "How to organize research and collaboration in order to gain new knowledge?" conference, March 3, 2020.

**Drosos, Petros:** Responsbaner og prediktorer for antipsykotisk respons; bedre effekt av amisulprid? Gardermokurset i biologisk psykiatri, November 11, 2020 (digital).

**Fathian, Farivar:** Inflammation and psychiatric disorders, CRP and antipsychotics, Gardermokurset i biologisk psykiatri, Oslo, November 11, 2020 (digital).

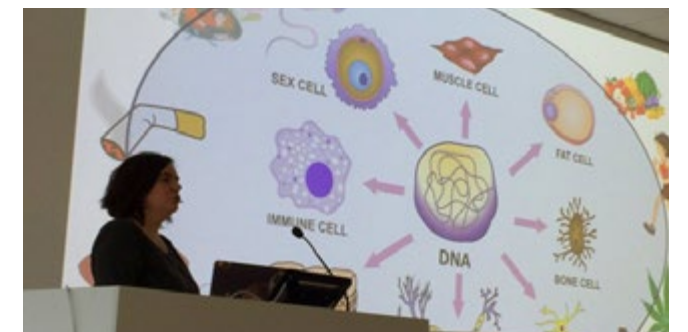
**Frei, Oleksandr:** MiXeR, pleioFDR and MOSTest tools for genetic analysis of two or more traits, New statistical genetics approaches, Oslo, January 29, 2020.

**Gjerde, Kristian Varden:** Adhesjonsmolekyler ved schizofreni og antipsykotisk behandling, Gardermokurset i biologisk psykiatri, November 11, 2020 (digital).

**Hoprekstad, Gunnhild Eldhuset:** Responsbaner og prediktorer for antidepressiv respons av antipsykotisk behandling, Gardermokurset i biologisk psykiatri, November 11, 2020 (digital).

**Johnsen, Erik:** Hva vet vi, og hva vet vi ikke om sannsynlighet for antipsykotisk effekt? Norwegian Psychiatric Association Annual Meeting, Trondheim, Norway, March 12, 2020.

**Johnsen, Erik:** Kliniske relevante forskjeller finnes mellom antipsykotika: hovedfunn fra BeSt InTro, Gardermokurset i biologisk psykiatri, November 12, 2020 (digital).



**Le Hellard, Stephanie:** Epigenetics studies in the BCBP: Identifying markers of treatment response, "How to organize research and collaboration in order to gain new knowledge?" conference, Bergen, March 3, 2020.



**Shadrin, Alexey:** Largest GWAS of Alzheimer's Disease, NO-AD network annual meeting, November 25, 2020 (digital).

**Stavrum, Anne-Kristin:** Epigenetic biomarkers for psychosis, "How to organize research and collaboration in order to gain new knowledge?" conference, Bergen, March, 2020.

**Strømme, Maria Fagerbakke:** Mortality and non-use of antipsychotic drugs in schizophrenia, Network meeting: Research on "medication-free treatment", October 19, 2020 (digital).

**Ueland, Torill:** Cognitive interventions for psychotic disorders, The International Society for Psychological and Social Approaches to Psychosis (ISPS), Hamar, February 6, 2020.

**Vaskinn, Anja:** Sosialkognitiv trening ved schizofreni, annual meeting of International Society for Psychological and Social approaches to psychosis (ISPS) Norway, Hamar, February 6, 2020.

## Patient Organizations and Health Personnel

### Selected Presentations

**Aminoff, Sofie Ragnhild:** Bipolar lidelse, Mestringkurs i regi av Bipolarforeningen, Scandic Solli Plass, Oslo, October 8, 2020.

**Andreassen, Ole:** Bipolar lidelse – mestring er målet. Åpent møte OUS, Oslo, February 10, 2020.

**Andreassen, Ole:** Forskning på psykiske lidelser. LFSS jubileumsmøte, March 5, 2020.

**Andreassen, Ole:** Hjerne-karriko ved psykisk sykdom, Lipidklubben seminar, October 12, 2020.

**Andreassen, Ole:** Fremtidens psykiatri og ny behandlingsalternativer, Spesialistkurs psykiatri, November 11, 2020.

**Drosos, Petros:** Responsbaner og prediktorer for antipsykotisk respons; bedre effekt av amisulprid? Therapists' internal meeting, Varatun, Sandnes DPS, Sandnes, Norway, November 11, 2020

**Haram, Marit:** Comorbidity to severe mental disorders, Søndre Oslo DPS, December 16, 2020.

**Henriksen, Tone Elise Gjøtterud:** Lys og mørke som behandling av affektive lidelser, LIS lecture for Helse Nord, Helse Førde, digital lecture, September 30, 2020

**Henriksen, Tone Elise Gjøtterud:** Affective disorders, nurse students, Høgskulen på Vestlandet, 2 lectures May, 8, 2020

**Hilland, Eva:** Current approaches in human neuroimaging of depression, FOU-avdelingen, Voksenpsykiatrisk avdeling Vinderen, Diakonhjemmet sykehus, January 2020.

**Ihler, Henrik Myhre:** Misperception of sleep in bipolar disorder, Faglunsi, Nydalen DPS, Norway, November 4, 2020.

**Johnsen, Erik:** Psykoselidelser, Pårørendeseminar, Bergen, Norway, February 15, 2020.

**Johnsen, Erik:** Farmakologisk behandling av ikke-affektive psykoser, emnekurs i psykofarmakologi, Bergen, Norway, January 15 and September 9, 2020

**Johnsen, Erik:** Psykofarmakologi - med hovedvekt på antipsykotika, Grunnkurs for leger i spesialisering, Stavanger, Norway, November 26, 2020

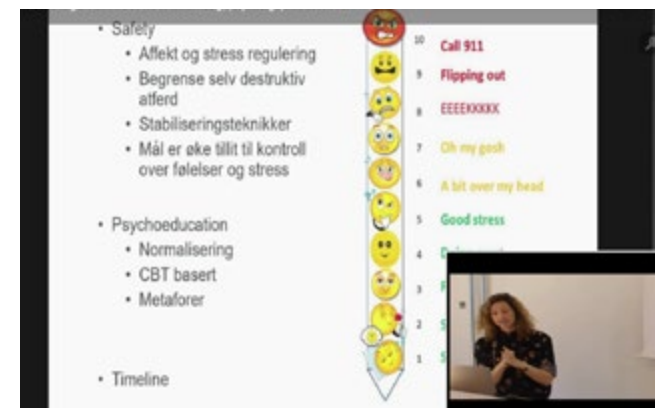
**Kjelby, Eirik:** Ulike depresjonsforløp ved psykoselidelser - hva betyr det for behandling? Akuttpsykiatrikonferansen 2020, Oslo, Norway, Feb 7, 2020

**Lagerberg, Trine Vik:** Om årsaker, diagnostikk og behandling av bipolar lidelse, Bipolarforeningens Mestringskurs, February 12, 2020.

**Lagerberg, Trine Vik:** MinDag og bruk av digitale verktøy i forskning og behandling av psykiske lidelser, Forskningsforum Ahus, Dec 11, 2020.

**Melle, Ingrid:** Diagnostisk forståelse, Grunnkurs i psykiatri, Zoom, November 17, 2020.

**Ottesen, Akiyah:** Transkulturell psykiatri med fokus på forskning, LIS undervisning, Gaustad, Oslo, Norge, June 2, 2020



**Ottesen, Akiyah:** Traume og psykose, Fag-TIPS, OUS, Oslo, Norway, October 9, 2020

**Pedersen, Geir:** Global Assessment of Functioning, Clinic of Mental Health and Addiction, Oslo university hospital, Ullevål, November 26, 2020.

**Smeland, Olav:** Arv og miljø - hvorfor får noen bipolar lidelse, thematic evening "Vanskelige familierelasjoner", Bipolarforeningen, December 3, 2020 (digital).

**Smelror, Runar:** Samspill mellom kognisjon, symptomer og hjernestruktur hos ungdom med psykoselidelser, Fagmøte, Center of psychopharmacology, Diakonhjemmet Hospital, Oslo, Norway, February 2, 2020.

**Smelror, Runar:** Forbedret oppdagelse og behandling av milde psykosesyntomer ved bruk av innovativ teknologi, Undervisning LIS-leger, Department of Psychiatry, Diakonhjemmet Hospital Oslo, Norway, February 11, 2020.

**Svensden, Ingrid Hartveit:** Psychosis, self-disturbances and early intervention - Introductory course for nursing students in clinical practice, November 11, 2020.

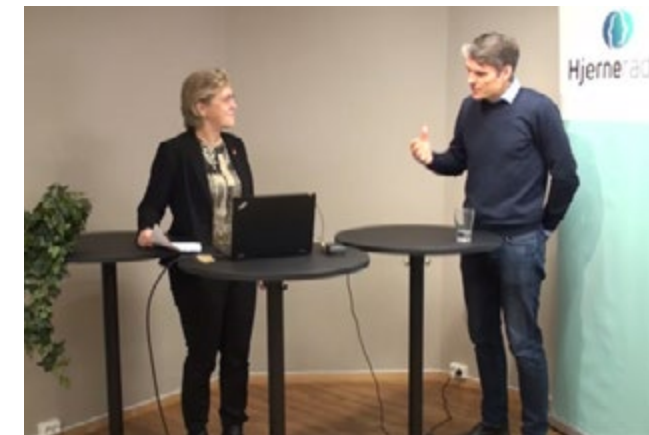
**Sønderby, Ida Elken:** En smaksprøve på forskning på 16p11.2 delesjonen - med lidt ekstra fokus på hjernestruktur, Digitalt fagkurs - 16p11.2 delesjonssyndrom og nevrouviklingsforstyrrelser, Frambu kompetansesenter for sjeldne diagnoser, November 20, 2020

**Ueland, Torill:** Course on implementation of cognitive remediation in Jobbmestrende Oppfølging, Sonans/NAV, Drammen, Norway, August 27-28 and September 14, 2020.

**Ødegaard, Ketil Joachim:** Organisering av forskning i divisjon psykisk helsevern, HUS, Nevroklinikken, Bergen, December 2020.

## General Public

### Selected Presentations and Activities



**Andreassen, Ole:** Fremtidens psykiatri- fra molekyler til psyke? Hjernekonferansen 2020, Hjernerådet, November 3, 2020.

**Elvsåshagen, Torbjørn:** Hjernens formbarhet i møte med livsvansker, Hjernerådet og Rådet for psykisk helse, Litteraturhuset, September, 2020.

**Hoprekstad, Gunnhild Eldhuset:** Vil betennelsesdempende medisin hjelpe mot psykose-symptomer? Forsker Grand Prix 2020, Bergen, September 23, 2020

**Johnsen, Erik:** Klinisk psykiatrisk behandling - med eller uten medikamenter? Hjernekonferansen, Oslo, Norway, November 3, 2020

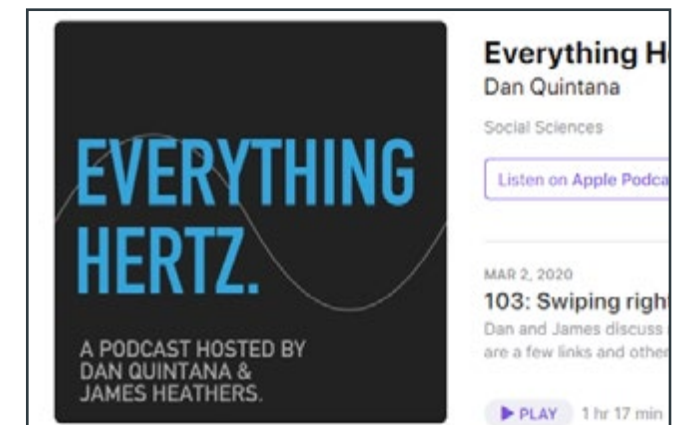
**Lagerberg, Trine Vik:** Selvmordsforskning ved NORMENT, temakveld på Litteraturhuset i regi av NORMENT og Bipolarforeningen, January 30, 2020

**Lagerberg, Trine Vik:** Hva er bipolar lidelse? Digital temakveld for Bipolarforeningen, October 12, 2020.



**Bell, Christina:** Episode 26: sikkerhetspsykologi, participation in a podcast episode, Psykopoden, December 1, 2020.

**Haukvik, Unn Kristin:** Psykopoden podcast, participation in several podcast episodes



**Quintana, Daniel:** Everything Hertz, participation in several podcast episodes





**Forskningsdagene 2020: The brain**

This year’s topic at the National Research Festival in Norway, Forskningsdagene, was the brain. During the festival people could experience an outdoor photo exhibition, “Den fantastiske hjernen”, with beautiful pictures of the brain at Rådhusplassen in Oslo. NORMENT contributed with two pictures from our brain imaging research.

On September 28, NORMENT arranged an open webinar titled “Kan hjerneforskning være en nøkkel til å forstå psykiske lidelser?” (Is brain research the key to understand mental illness?). Several researchers from NORMENT shared their knowledge on how their research area can be used to get a better understanding about mental illness. The webinar covered topics such as genes and heritability (researcher Olav B. Smeland), the immune system (PhD student Maren Werner), brain imaging (postdoc Torgeir Moberget), and electrophysiological measures of brain activity (postdoc Torbjørn Elvsåshagen). Professor Jan Ivar Røssberg led the event and the panel discussion after the talks.

[Watch the recording of the webinar](#)



**Thematic evenings: Suicide and family relations in bipolar disorder**

NORMENT has a close collaboration with the Norwegian Bipolar Association. During 2020, the Association organized two thematic evenings in collaboration with NORMENT and Rådet for psykisk helse, with funding from Stiftelsen Dam.

On January 30, Trine Vik Lagerberg, section manager and researcher at NORMENT, gave a talk about our ongoing research on bipolar disorder on a thematic evening about suicide, which took place at Litteraturhuset in Oslo.

[Watch the recording of the seminar](#)

On December 3, researcher Olav B. Smeland from NORMENT gave a talk about genetics and bipolar disorder at a digital thematic evening about family relations and bipolar disorder.

[Watch the recording of the webinar](#)







FORSKARAR: Rune Kroken (t.h.) og Eirik Johnsen har leia forskingsprosjektet.  
FOTO: ODDGEIR ØYSTESE / NRK

## Truleg lik situasjon med mange medisinar

For noko av det som gjer studien spesiell, er at den er gjennomført uavhengig av legemiddelindustrien. Det finst nokre få liknande studiar, men studien er sjeldan i europeisk samanheng.

Kulturhistorie Anmeldelse Kultur NRK TV Livsstil Musik Film og serier Kunst Sport Medier Design og mote Opptak og billett Teater og

## Christine Koht er stolt over sin diagnose

Christine Koht er opptatt av å fjerne skam og tabuer fra psykiske lidelser. Sevr har hun diagnosen bipolar og NRK ble med da hun skulle takke sin psykiater fordi han har fjernet skammen og gjort henne stolt.



Marianne Restad Carlsen  
Publisert 23. okt. 2020 kl. 12:19



Fjern Sløfdeannonser T-overs Superlokale E-godtormsæl Sel eller ansett og stiller Søk Meny



Tone si forskning har endra behandlinga av bipolar lidning



## Genene som gir psykiske lidelser, kan også styre vekta

Mennesker med alvorlig depresjon eller bipolar lidelse kan ha større genetisk risiko for fedme, mens personer med schizofreni kan være beskyttet mot overvekt, viser en norsk studie.

## Media Coverage

**Aas, Monica:** [Immune-HPA Axis Dysregulation and Stress Linked to Postpartum Psychosis](#), news article, PsychiatryAdvisor, January 21, 2020

**Andreassen, Ole:** [BMI linked to major psychiatric disorders](#), chronicle, Healio, January 9, 2020

**Andreassen, Ole:** [Nå er ketamin godkjent som legemiddel mot depresjon i Norge](#), news article, Forskning.no, January 17, 2020

**Andreassen, Ole:** [Vanlige gener gir alvorlige psykiske lidelser](#), news article, Apollon, April 22, 2020.

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**Andreassen, Ole:** [Christine Koht er stolt over sin diagnose](#), news article, NRK, October 10, 2020

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**Andreassen, Ole:** [Ketamin hjalp Kristin \(39\) ut av depresjonen. Nå tilbyr Kalnes som første sykehus i landet den samme behandling](#), news article, Fredrikstad blad, November 7, 2020.

**Andreassen, Ole:** [Hvordan påvirker korona oss i 2021?](#), blog, Medisinbloggen, UiO, December 28, 2020.

**Ellingsen, Dan-Mikael:** [Novel MRI-based approach can help optimize patient-clinician interactions](#), news article, News Medical, October 22, 2020.

**Fernandez, Sara:** [Study confirms new pathway for Alzheimer's disease degeneration](#), news article, Western BrainsCAN, June 29, 2020.

**Haukvik, Unn Kristin:** [Også en ekstremist kan være utilregnelig](#), chronicle, Aftenposten, June 8, 2020.

**Henriksen, Tone Elise Gjøtterud:** [Mørketerapi og oransje briller forkorter maniske perioder hos pasienter med bipolar lidelse](#), Interview NRK news radio and NRK Viten news article, January 20, 2020.

**Henriksen, Tone Elise Gjøtterud:** [Tone si forskning har endre behandlinga av bipolar lidning](#), news article, Sunnhordland, October 25, 2020,

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**Le Hellard, Stephanie:** [Kronprinsessa: – Vi har alle et ansvar nå for hverandres psykiske helse](#), news article, NRK, April 28, 2020.

**Le Hellard, Stephanie:** [Hva gjør sosial isolasjon med oss?](#), blog post, Det norske kongehusets blogg, April 28, 2020.

**Jakobsen, Petter and Ødegaard, Ketil Joachim:** [Ny norsk forskning: Armbånd avdekker depresjon](#), news article, VG+ September 16, 2020 and front page VG 17 September 2020

**Johnsen, Erik and Steen, Vidar M.:** [Stor skilnad på medisinar som skal vere like gode](#), news article, NRK, October 19, 2020.

**Melle, Ingrid and Andreassen, Ole:** [Støtter anbefalinger om Sentre for fremragende forskning \(SFF\)](#), chronicle, Khrono, June 4, 2020.

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**Tamnes, Christian K.:** [Hva vet vi om ungdomshjernen](#), news article, Paidos, December 11, 2020.

**Tamnes, Christian K.:** [Gir hjerneforskning svaret på hvorfor jenter er flinkere på skolen enn gutter?](#), news article, Forskning.no, August 24, 2020.

**Werner, Maren Caroline Frogner:** [Polygenic Risk Score Predicts Treatment Resistance in Schizophrenia](#), news article, Reuters / Medscape, April 02, 2020.

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## Societal Impact and Innovation

Mental disorders such as schizophrenia and bipolar disorders are still associated with stigma and considerable misinformation. To counteract stigma and make the new knowledge generated from our research available to the lay audience, we have a continuous focus on dissemination activities, including regular use of social media, organizing public events and recently launching a newsletter from the Centre.

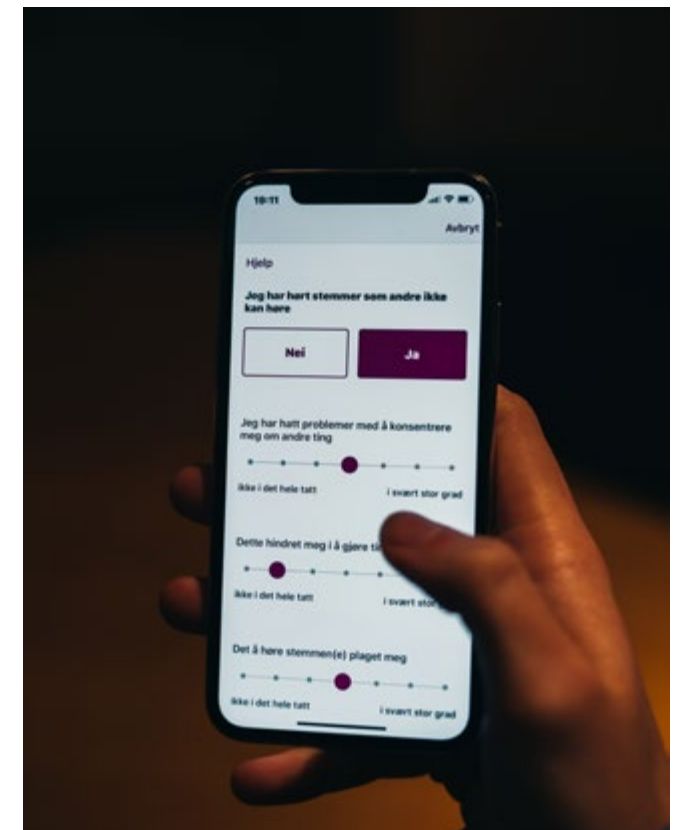
NORMENT has also provided added value by developing tools for prediction and stratification (genetics, imaging) which can lead to new knowledge to improve clinical treatment. These include novel statistical tools developed in collaboration with researchers at the University of California San Diego, such as "MOSTest" (van der Meer et al. 2020, Nature Communications). Gaining more knowledge about mechanisms and developing diagnostic tools for stratification and outcome prediction will lead to better treatment planning for psychotic disorders and will thus be directly and indirectly of huge value to society.

As part of our "eNORMENT" strategy, we have several projects based on new promising eHealth technology. A good example is the smartphone app called "MinDag" ("My Day"), which has been developed at NORMENT and is now applied in research projects. The primary function of the app is to allow for collection of data from study participants on areas such as sleep, daily activities, mood and psychotic symptoms, and substance use over time.

Participants will use MinDag together with an activity tracker (actigraph) that passively measures physical movement and exposure to light. One of the goals of this project is to improve the understanding of interactions between lifestyle and environmental factors, as well as symptoms. The MinDag app allows for more detailed longitudinal symptom assessments and can also capture shorter symptom changes. This may give new insights into the large variations in the course of severe mental illness and contribute to detect early signs of relapse and thereby improve treatment.

The Psychopathological Mechanisms group at NORMENT, headed by Trine Vik Lagerberg, is now actively recruiting participants for bipolar disorder studies involving the MinDag app. The research project is integrated with the specialized clinical unit for bipolar disorder at Nydalen DPS, Oslo University Hospital, that was newly established based on an initiative from Lagerberg and planned in collaboration with expertise from clinical researchers at NORMENT.

Several researchers at the Centre also do part-time clinical work in the unit, which is a good illustration of the valuable clinical interactions and fruitful collaborations between hospital units and NORMENT researchers. Both the digital tool and the new specialized clinical unit illustrate the societal impact of our Centre.

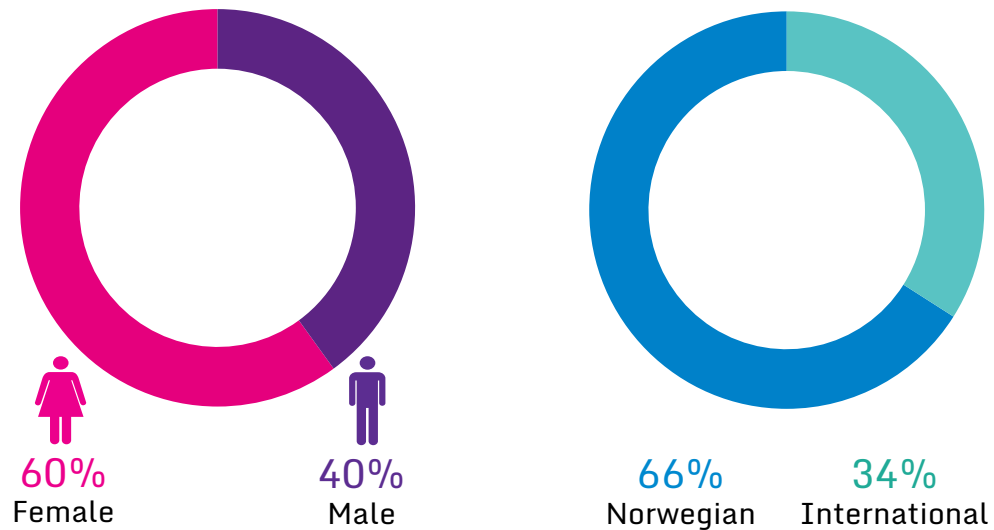


The MinDag app developed by NORMENT and UiO



# Facts about NORMENT

## Employees



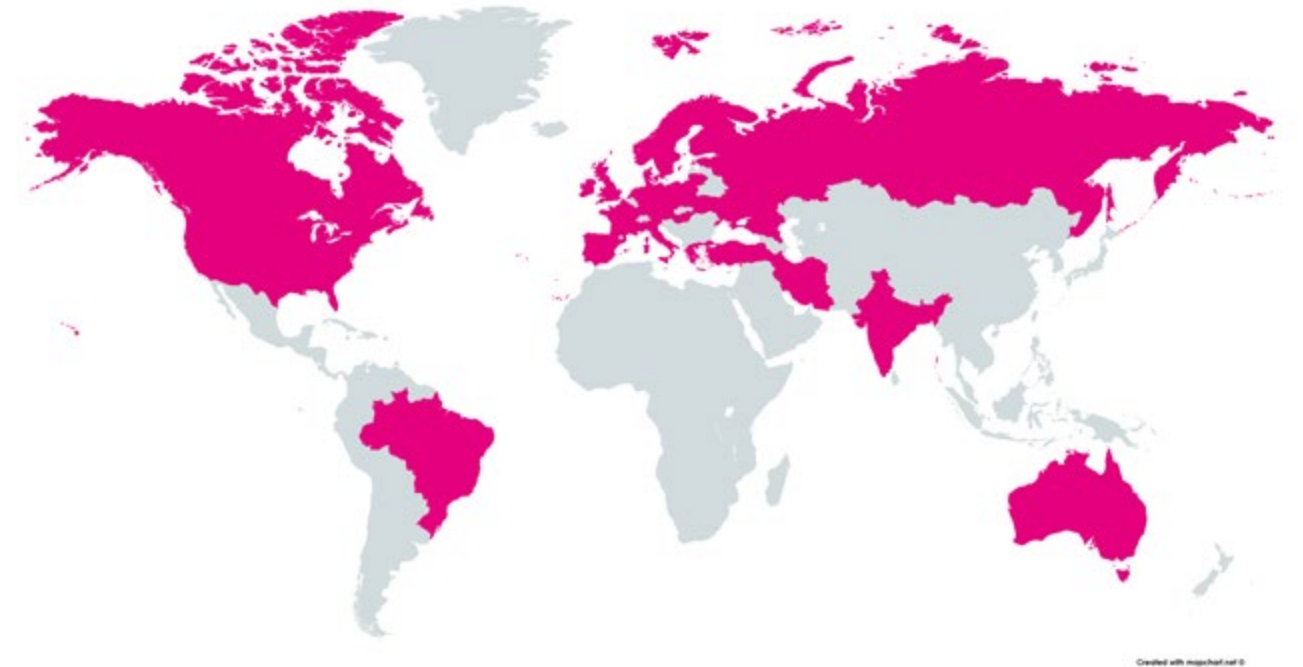
## Professional Backgrounds

- Medicine 28%
- Psychology 28%
- Neuroscience 11%
- Biology 8%
- Genetics 6%
- Nursing 5%
- Mathematics 4%
- Other field 3%
- Informatics 3%
- Engineering 2%
- Business/Administration 1%
- Physics 0,5%



## Staff Positions

- PhD students 28%
- Postdoctoral fellows 19%
- Other research personnel 15%
- Researchers 11%
- Technical personnel 9%
- Professors/Associate professors 6%
- Scientific assistants 6%
- Administrative personnel 3%
- Master students 2%
- User representative 1%



29 different nationalities are represented at NORMENT

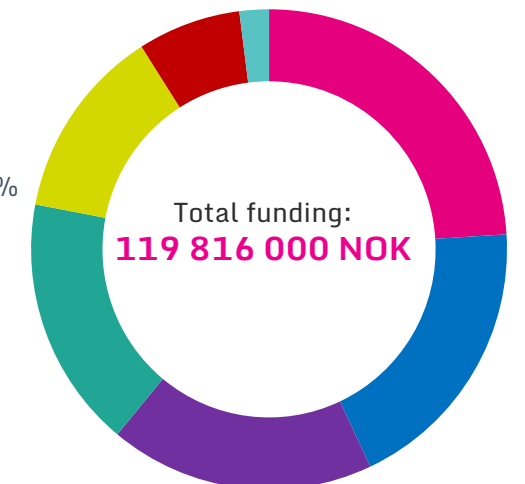
## Office Locations

- Ullevål, Oslo 56%
- Haukeland, Bergen 14%
- Other location 9%
- Sandviken, Bergen 8%
- Vinderen, Oslo 5%
- Gaustad/Rikshospitalet, Oslo 5%
- Forskningsparken, Oslo 3%



## Funding

- RCN (other project funding) 24%
- RCN (CoE funding) 19%
- Own funding - in kind (partner institutions) 18%
- Other public funding 17%
- International project funding 12%
- Financing from host institution 7%
- Private funding 2%



## NORMENT Staff

Last name	First name	Position	Research group leader
Aaberg	Linn-Marie Elise	Nurse	Erik Johnsen
Aas	Monica	Researcher	Nils Eiel Steen
Agartz	Ingrid	Core researcher	Ingrid Agartz
Akkouh	Ibrahim	Post doc	Srdjan Djurovic
Alisaukiene	Renata	PhD student	Erik Johnsen
Alnæs	Dag	Researcher	Lars T. Westlye
Aminoff	Sofie Ragnhild	Post doc	Trine Vik Lagerberg
Andersen	Jostein	Master student	Lars T. Westlye
Andreassen	Ole	Director & Core researcher	Ole A. Andreassen
Andreou	Dimitrios	Post doc	Ingrid Agartz
Andresen	Lavinia Athanasia	Engineer	Srdjan Djurovic
Aspesletten	Maria	Scientific assistant	Torill Ueland
Bahrami	Shahram	Post doc	Ole A. Andreassen
Bakken	Eivind	Nurse	Nils Eiel Steen
Balafkan	Novin	Post doc	Erik Johnsen
Barrett	Elisabeth A.	Psychologist	Trine Vik Lagerberg
Barth	Claudia	Post doc	Ingrid Agartz
Bartz-Johannessen	Christoffer	Biostatistician	Erik Johnsen
Beck	Dani	PhD student	Lars T. Westlye
Bell	Christina	PhD student	Unn Kristin H. Haukvik
Beresniewicz	Justyna	PhD student	Kristiina Kompus
Berle	Jan Oystein	Associate professor	Erik Johnsen
Berthet	Pierre	Post doc	Lars T. Westlye
Bettella*	Francesco	Research technician	Ole A. Andreassen
Birkenæs	Viktoria	Scientific assistant	Ingrid Agartz
Bjarke	Jill	Research coordinator	Erik Johnsen
Bjella	Thomas	Database manager	Database
Bjerkaas-Kjeldal	Kristine	Research technician	Srdjan Djurovic
Bless	Josef	Post doc	Kristiina Kompus
Brandt	Christine Lycke	Administrative manager	Administration
Brattbakk	Hans-Richard	Research technician	Vidar M. Steen
Brunstad	Solveig	Medical student (forskerlinjen i medisin)	Stéphanie Le Hellard
Bruun	Sandra	Research coordinator	Lars T. Westlye
Buer	Liliana	Scientific assistant	Trine Vik Lagerberg
Büchmann	Camilla	PhD student	Trine Vik Lagerberg
Busch-Christensen	Cecilie	User representative	Administration
Cheng	Weiqui	Post doc	Ole A. Andreassen
Christensen	Karin Louise L.	Scientific assistant	Lars T. Westlye
Christoffersen	Cecilie	Scientific assistant	Ingrid Melle

\* = Ended their position in 2020

Last name	First name	Position	Research group leader
Chu	Yunhan	Researcher	Ole A. Andreassen
Craven	Alexander R	Engineer	Kristiina Kompus
Dahl	Andreas	PhD student	Lars T. Westlye
Davies	Richard	Post doc	Stéphanie Le Hellard
De Lange	Ann-Marie	Post doc	Lars T. Westlye
Diekmann	Silvia	Head physician	Ketil J. Ødegaard
Dieset	Ingrid	Affiliated	Nils Eiel Steen
Djurovic	Srdjan	Core researcher	Srdjan Djurovic
Drachmann*	Tove Matzen	Clinical assessment personnel	Ingrid Agartz
Drosos	Petros	PhD student	Erik Johnsen
Dwyer	Gerard	PhD student	Kristiina Kompus
Ellingsen	Dan-Mikael	Post doc	Lars T. Westlye
Elvsåshagen	Torbjørn	Post doc	Erik Gunnar Jönsson
Engen	Haakon	Researcher	Lars T. Westlye
Engen	Kristine	PhD student	Ingrid Agartz
Engen	Magnus Johan	PhD student	Torill Ueland
Engh	John Abel	Affiliated	Nils Eiel Steen
Faerden	Ann	Mentor	Ingrid Melle
Fagerbakke Strømme	Maria	PhD student	Erik Johnsen
Fasmer	Ole	Professor	Ketil J. Ødegaard
Fathian	Farivar	Administrative personnel	Erik Johnsen
Fernandes Neto	Carla	Engineer	Stéphanie Le Hellard
Fernandez	Sara	Post doc	Lars T. Westlye
Fischer-Vieler	Thomas	PhD student	Unn Kristin H. Haukvik
Flaaten	Camilla Bärthel	PhD student	Torill Ueland
Frei	Oleksandr	Researcher	Ole A. Andreassen
Frei	Evgeniia	Research technician	Srdjan Djurovic
Frid	Leila Marie	Nurse	Ketil J. Ødegaard
Funderud	Cecilie Klem	Scientific assistant	Torill Ueland
Ghorbani	Sadaf	Post doc	Erik Johnsen
Gjerde	Kristian Varden	PhD student	Erik Johnsen
Gjestad	Rolf	Statistician	Erik Johnsen
Granerud	Guro	PhD student	Erik Gunnar Jönsson
Gundersen	Line	Nurse	Nils Eiel Steen
Gurholt	Tiril	Post doc	Lars T. Westlye
Haakonsen	Marina Herfindal	Nurse/administrative personell	Nils Eiel Steen
Haatveit	Beathe	Post doc	Torill Ueland
Hagen	Marie	Research technician	Vidar M. Steen
Hagen*	Marthe	User representative	Administration
Hansson	Lars	Engineer	Srdjan Djurovic
Haram	Marit	Post doc	Nils Eiel Steen
Haugen	Egil Anders	Psychiatric social educator	Erik Johnsen
Haukvik	Unn Kristin	Group leader	Unn Kristin H. Haukvik

\* = Ended their position in 2020



Last name	First name	Position	Research group leader
Helleland	Tor	Administrative personnel	Administration
Henriksen	Tone Elise Gjøtterud	PhD student	Erik Johnsen
Hilland	Eva	Post doc	Ingrid Agartz
Hindley	Guy	PhD student	Ole A. Andreassen
Hirnstain	Marco	Researcher	Kristiina Kompus
Hjell	Gabriela	PhD student	Unn Kristin H. Haukvik
Hjelmervik*	Helene	Post doc	Kristiina Kompus
Hjelmtvedt	Torkild	Research nurse	Ketil J. Ødegaard
Holdhus	Rita	Engineer	Vidar M. Steen
Holen	Børge	PhD student	Ole A. Andreassen
Holmgren	Asbjørn	PhD student	Srdjan Djurovic
Hope	Sigrun	Affiliated	Ole A. Andreassen
Hoprekstad	Gunnhild Eldhuset	PhD student	Erik Johnsen
Huflåtten	Idun Bernadotte	Neuropsychological assessment personnel	Torill Ueland
Hughes	Tim	Researcher	Srdjan Djurovic
Høegh	Margrethe C.	PhD student	Trine Vik Lagerberg
Icick*	Romain	Visiting researcher	Trine Vik Lagerberg
Ihler	Henrik Myhre	PhD student	Ingrid Melle
Inderhaug	Elin	Bioengineer	Srdjan Djurovic
Jakobsen	Petter	PhD student	Ketil J. Ødegaard
Johannessen	Cecilie	PhD student	Ingrid Agartz
Johansen	Hogne Melle	Scientific assistant	Ole A. Andreassen
Johansen	Ingrid Torp	PhD student	Nils Eiel Steen
Johnsen	Erik	Core researcher	Erik Johnsen
Jönsson	Erik	Group leader	Erik Gunnar Jönsson
Jørgensen	Kjetil Nordbø	Post doc	Ingrid Agartz
Karthikeyan	Sandeep	Engineer	Database
Karadag	Naz	PhD student	Ole A. Andreassen
Kaufmann	Tobias	Researcher	Lars T. Westlye
Kazimierczak	Katarzyna	Research technician	Kristiina Kompus
Kessler	Ute	Researcher	Ketil J. Ødegaard
Kippersund	Ida	Scientific assistant	Ingrid Agartz
Kjelby	Eirik	PhD student	Erik Johnsen
Kjelkenes	Rikka	PhD student	Lars T. Westlye
Kompus*	Kristiina	Group leader	Kristiina Kompus
Koppe	Felix	Scientific assistant	Torill Ueland
Kristiansen	Ingvil Julie	Research nurse	Ketil J. Ødegaard
Krogenes	Marianne	Nurse	Erik Johnsen
Kroken	Rune A	Associate Professor	Erik Johnsen
Kusztrits	Isabella	PhD student	Kristiina Kompus
Lagerberg	Trine Vik	Group leader	Trine Vik Lagerberg
Laloyaux	Julien	Post doc	Kristiina Kompus
Lange	Elisabeth	PhD student	Ingrid Agartz

\* = Ended their position in 2020

Last name	First name	Position	Research group leader
Laskemoen*	Jannicke	PhD student	Ingrid Melle
Langeland	Marianne	Research nurse	Ketil J. Ødegaard
Le Hellard	Stephanie	Core researcher	Stéphanie Le Hellard
Leistad Christensen	Karin Louise	Scientific assistant	Lars T. Westlye
Lengali	Lilly	Scientific assistant	Lars T. Westlye
Lin	Aihua	Post doc	Ole A. Andreassen
Ljung	Frida Mathilda	Scientific assistant	Torbjørn Elvåshagen
Lofthus	Ingvild	Research technician	Lars T. Westlye
Lund	Martina Jonette	PhD student	Lars T. Westlye
Lund	Anders	Professor	Ketil J. Ødegaard
Lund-Heimark	Hallvard	Resident doctor	Erik Johnsen
Lunding	Synve Hoffart	PhD student	Nils Eiel Steen
Lyngstad	Siv Hege	PhD student	Ingrid Melle
Løberg	Else-Marie	Sectional director	Erik Johnsen
Løchen	Aili	Scientific assistant	Lars T. Westlye
Markl	Therese	Database consultant	Database
Marquardt	Lynn	PhD student	Kristiina Kompus
Maximov*	Ivan	Post doc	Lars T. Westlye
Melle	Ingrid	Core researcher	Ingrid Melle
Moberget	Torgeir	Researcher	Lars T. Westlye
Mohn	Christine	Neuropsychological assessment personnel	Torill Ueland
Motazed	Ehsan	Post doc	Ole A. Andreassen
Myhre	Anne M.	Associate professor	Ingrid Agartz
Mørch-Johnsen	Lynn	Researcher	Ingrid Agartz
Mørkved	Nina	PhD student	Erik Johnsen
Nerhus	Mari	Post doc	Trine Vik Lagerberg
Nerland	Stener	PhD student	Ingrid Agartz
Neto	Carla Fernandes	Engineer	Stéphanie Le Hellard
Norbom	Linn	Post doc	Ingrid Agartz
Nærlund	Terje	Affiliated	Ole A. Andreassen
O'Connell	Kevin	Post doc	Ole A. Andreassen
Olsen	Axel	Scientific assistant	Ole A. Andreassen
Olsen	Stine Holmstul	Clinical assessment personnel	Trine Vik Lagerberg
Oltedal	Leif	Associate professor	Ketil J. Ødegaard
Ormerod	Monica	PhD student	Nils Eiel Steen
Osete	Jordi	Post doc	Srdjan Djurovic
Ottesen	Akiah	Post doc	Ingrid Melle
Pedersen	Geir	Affiliated	Ingrid Melle
Pedersen	Mads Lund	Researcher	Lars T. Westlye
Pentz	Atle	PhD student	Erik Gunnar Jönsson
Polushina	Tatiana	Researcher	Stéphanie Le Hellard
Puppo	Francesca	Post doc	Srdjan Djurovic
Quintana	Daniel	Researcher	Lars T. Westlye

\* = Ended their position in 2020

Last name	First name	Position	Research group leader
Reis de Assis	Denis	Post doc	Srdjan Djurovic
Reponen	Elina Johanna	PhD student	Nils Eiel Steen
Richard	Geneviève	Post doc	Lars T. Westlye
Rise	Henning Hoel	Research coordinator	Lars T. Westlye
Roelfs	Daniel	PhD student	Lars T. Westlye
Rokicki	Jaroslav	Post doc	Lars T. Westlye
Romm	Kristin Lie	Associate professor	Ingrid Melle
Rustan*	Øyvind	Scientific assistant	Lars T. Westlye
Rødevand	Linn	PhD student	Nils Eiel Steen
Sahl	André	Clinical assistant	Torill Ueland
Sanders	Anne-Marthe	PhD student	Lars T. Westlye
Shadrin	Alexey	Researcher	Ole A. Andreassen
Simonsen	Carmen	Post doc	Ingrid Melle
Sinkeviciute	Igne	PhD student	Erik Johnsen
Slapø	Nora	PhD student	Erik Gunnar Jönsson
Smeland	Olav	Researcher	Ole A. Andreassen
Smelror	Runar	Post doc	Ingrid Agartz
Spindola	Leticia	Post doc	Stéphanie Le Hellard
Stabell	Lena Antonsen	Database consultant	Erik Johnsen
Stautland	Andrea	Medical student (forskerlinjen i medisin)	Ketil J. Ødegaard
Stavrum	Anne-Kristin	Post doc	Stéphanie Le Hellard
Steen	Nils Eiel	Group leader	Nils Eiel Steen
Steen	Vidar M.	Core researcher	Vidar M. Steen
Stokowy	Tomasz	Engineer	Vidar M. Steen
Storli	Ragnhild	Administrative personnel	Administration
Storvestre	Guttorm Breivik	PhD student	Unn Kristin H. Haukvik
Svendsen	Ingrid Hartveit	PhD student	Ingrid Melle
Syrstad	Vigdis Elin Giæver	PhD student	Ketil J. Ødegaard
Szabo	Attila	Post doc	Srdjan Djurovic
Sæther	Linn Sofie	PhD student	Torill Ueland
Sødal	Hedda B.T	Clinical assessment personnel	Ingrid Agartz
Sønderby	Ida Elken	Researcher	Srdjan Djurovic
Tamnes	Christian K.	Professor	Lars T. Westlye
Tesli	Natalia	PhD student	Unn Kristin H. Haukvik
Tesli	Martin S	Affiliated	Ole A. Andreassen
Timpe	Clara	Master student	Erik Gunnar Jönsson
Torsvik	Anja	Post doc	Vidar M. Steen
Trentani	Andrea	Engineer	Vidar M. Steen
Tønnesen	Siren	PhD student	Lars T. Westlye
Ueland	Torill	Group leader	Torill Ueland
Ulrichsen	Kristine Moe	PhD student	Lars T. Westlye
Valstad	Mathias	PhD student	Erik Gunnar Jönsson
Van der Meer	Dennis	Researcher	Lars T. Westlye

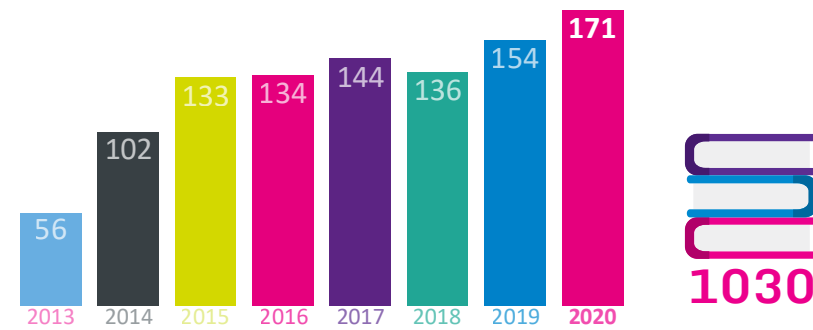
\* = Ended their position in 2020

Last name	First name	Position	Research group leader
Vandenberghe	Matthieu	Researcher	Srdjan Djurovic
Vaskinn	Anja	Researcher	Torill Ueland
Vedde	Ingeborg Helle	Administrative personnel	Administration
Vik	Ruth Kristine	Research coordinator	Ingrid Melle
Villar	Jonelle	PhD student	Stéphanie Le Hellard
Voldsbekk	Irene	PhD student	Lars T. Westlye
Værnes	Tor Gunnar	Affiliated	Trine Vik Lagerberg
Weber*	Sarah	Post doc	Kristiina Kompus
Wedervang-Resell	Kirsten	PhD student	Ingrid Agartz
Werner	Maren Caroline Frogner	PhD student	Nils Eiel Steen
Westlye	Lars T.	Core researcher	Lars T. Westlye
Widing	Line	PhD student	Ingrid Melle
Winterton	Adriano	PhD student	Lars T. Westlye
Wirgenes	Katrine Verena	Researcher	Ole A. Andreassen
Wold	Kristin Fjelnseth	PhD student	Ingrid Melle
Wolfers	Thomas	Post doc	Lars T. Westlye
Wortinger	Laura	Post doc	Ingrid Agartz
Ødegaard	Ketil Joachim	Group leader	Ketil J. Ødegaard
Åsbø	Gina	PhD student	Ingrid Melle

\* = Ended their position in 2020



# Publications



NORMENT researchers published 171 scientific papers in 2020, of which 21 were published in scientific journals with an impact factor of above 10, including *Science*, *Biological Psychiatry*, *JAMA Psychiatry*, *American Journal of Psychiatry*, *Cell*, *Lancet Psychiatry*, *Molecular Psychiatry*, and *Nature Communications*.

Aas M, Ueland T, Inova A, Melle I, Andreassen OA, Steen NE. Childhood Trauma Is Nominally Associated With Elevated Cortisol Metabolism in Severe Mental Disorder. *Front Psychiatry*. 2020;11:391.

Aas M, Vecchio C, Pauls A, Mehta M, Williams S, Hazelgrove K, et al. Biological stress response in women at risk of postpartum psychosis: The role of life events and inflammation. *Psychoneuroendocrinology*. 2020;113:104558.

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Alnæs D, Kaufmann T, Marquand AF, Smith SM, Westlye LT. Patterns of sociocognitive stratification and perinatal risk in the child brain. *Proc Natl Acad Sci U S A*. 2020;117(22):12419-27.

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Aminihajbashi S, Hagen T, Andreassen OA, Laeng B, Espeseth T. The effects of cognitive abilities and task demands on tonic and phasic pupil sizes. *Biol Psychol*. 2020;156:107945.

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Andreou D, Saetre P, Fors BM, Nilsson BM, Kullberg J, Jönsson EG, et al. Cardiac left ventricular ejection fraction in men and women with schizophrenia on long-term antipsychotic treatment. *Schizophr Res*. 2020;218:226-32.

Bahrami S, Steen NE, Shadrin A, O'Connell K, Frei O, Bettella F, et al. Shared Genetic Loci Between Body Mass Index and Major Psychiatric Disorders: A Genome-wide Association Study. *JAMA Psychiatry*. 2020;77(5):503-12.

Bang L, Tamnes CK, Norbom LB, Thomassen RA, Holm JS, Skotte LH, et al. Associations of age, body mass index and biochemical parameters with brain morphology in patients with anorexia nervosa. *Eur Eat Disord Rev*. 2021;29(1):74-85.

Barrett EA, Aminoff SR, Simonsen C, Romm KL. Opening the curtains for better sleep in psychotic disorders - considerations for improving sleep treatment. *Compr Psychiatry*. 2020;103:152207.

Barth C, de Lange AG. Towards an understanding of women's brain aging: the immunology of pregnancy and menopause. *Front Neuroendocrinol*. 2020;58:100850.

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