FUGE
Mid -Norway

Annual report 2009

FUGE

Large-scale Programme
The Research Council of Norway

NTNU – Trondheim
Norwegian University of
Science and Technology

Contact information FUGE Mid-Norway
Faculty of Natural Sciences and Technology
Natural Science Building
Norwegian University of Science and Technology
N0-7491 Trondheim
Norway
Phone: (+47) 735 96 064
E-mail: postmottak@nt.ntnu.no

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	Professor Marit Otterlei, Faculty of Medicine, NTNU
Secretary:	Dr. Scient. Janne Østvang, Faculty of Natural Sciences and Technology, NTNU

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FUGE coordinator in Mid-Norway:
Janne Østvang (Adviser at the Faculty of Natural Sciences and Technology)

Visit us at	**http://www.ntnu.no/fuge (Norwegian)**
	http://www.ntnu.no/research/fuge (English)

Photo front page: iStock

About FUGE in Mid-Norway

FUGE is a national plan designed to enhance the quality and activity of functional genomics research in Norway, funded by the Research Council of Norway. For more information about the FUGE program please see: *www.fuge.no*

FUGE's backbone is the technology platforms that offer service and research related to specific technologies that are useful for functional genomics.

While a portion of the region's functional genomic projects have received funding from the Research Council of Norway, many other research groups at NTNU also conduct functional genomics research. These groups are found at the Faculty of Medicine, the Faculty of Natural Sciences and Technology, the Faculty of Information Technology, Mathematics and Electrical Engineering, as well as the Faculty of Arts.

BIOTECHNOLOGY FOR THE FUTURE

A fundamental change in biomedical research during the last couple of decades is the development of increasingly more resource-demanding technologies. Whereas twenty years ago, many researchers could single-handedly finance and run equipment for internationally competitive research, most research groups today are dependent on services from core facilities to conduct research at a high international level. Fortunately, this trend was realized by the people who started the FUGE programme. Through this initiative, research groups that would have been too weak to establish the necessary infrastructure on their own have been given help from service platforms to solve technologically advanced problems.

Today we are looking towards the end of the FUGE II period. There are no signals from the Research Council of Norway (NFR) that FUGE will continue. Instead, a programme titled Biotek 2012 has been proposed. In the fall of 2009, NFR invited all interested scientists and institutions to submit their visions of what Biotek 2012 should be. Through this process, NFR received an overwhelming amount of feedback, and this input from around the country is now freely accessible on NFR's website. Although many pointed out the importance of continuing the core facilities established under the FUGE programme, we do not yet know how or to what extent this will be done. At the beginning of FUGE, NFR's expectation was to see the funding of the platforms gradually being taken over by the mother institutions, in our case NTNU. And NTNU has taken a considerable load by supporting the FUGE platforms with roughly 7 million NOK annually. It is my conviction that this is money well spent.

NTNU wants to be an internationally recognized university. It is hard to see how NTNU can increase its international ranking without building a stronger environment in both basic and applied biotechnology. In the beginning of the 21st century, molecular biology and biotechnology are what information technology was at the end of the previous century: the strongest motor worldwide in driving scientific and industrial innovation. Consequently, the impact of this research area on scientific ranking will be very strong for the years to come. NTNU needs to discuss and decide how biotechnology should be prioritized in the future in order to capitalize on the innovative potential of this research field. One way to secure a firmer basis for this activity could be to make biotechnology a new thematic focus area at NTNU.

Large construction projects in recent years, such as Realfagbygget and the new university hospital, have given NTNU excellent laboratory space to accommodate research groups and core facilities for biomedicine and biotechnology. The challenge now is to allocate technical staff and advanced equipment to support the groups working in these laboratories.

By Magne Børset, Head of FUGE committee in Mid-Norway

THE FUGE NODES IN MID-NORWAY

Nationwide, there are ten different FUGE Technology Platforms with nodes distributed all over Norway. There are seven nodes in the Mid-Norway region. The activity of these nodes in 2009 is briefly presented here:

THE NORWEGIAN PROTEOMICS CONSORTIUM -NORPROTEOMICS

The Proteomics node in Mid-Norway offers a number of different technologies, services and training related to protein identification, quantitative proteomics, PTM analysis, 2D-DIGE and protein / peptide chromatography / separation techniques. In addition, the Proteomics node has a bioinfomatician to help with proteomics data analysis.


Photo: Kari Dahl

The Proteomics node in Mid-Norway is responsible for MOL3007, which is a practical laboratory course in mass spectrometri based proteomics.

An important part of the node in the future will be the implementation of quantitative proteomics analysis, which is both resource intensive and time consuming. This includes raising funds for purchasing of new MS-instrumentation (OrbiTrap) and to implement and streamline applications for visualization and processing of quantitative proteomics data. In 2010 the node will also implement Offgel prefractionation of protein extracts to achieve increased proteome deep-mining.

THE NORWEGIAN BIOINFORMATICS PLATFORM

The bioinformatics node in Mid-Norway is part of the national help desk network in bioinformatics, along with the Universities in Bergen, Oslo and Tromsø. The help desk includes general assistance in bioinformatics for various research groups and individual researchers. Additionally, the platform has worked actively to fund a national infrastructure for handling data from ultra-high throughput sequencing as well as Norwegian participation in Elixir, the European research infrastructure for bioinformatics.

In 2009, there has been increasing activity in large-scale sequencing, particularly related to metagenomics, in addition to the already established expertise areas of gene regulation (transcription factors, non-coding RNA) and general sequence analysis. There has also been increasing activity in prokaryote genome analysis.

The bioinformatics node at NTNU has arranged courses in the use of a statistical genome browser in 2009.

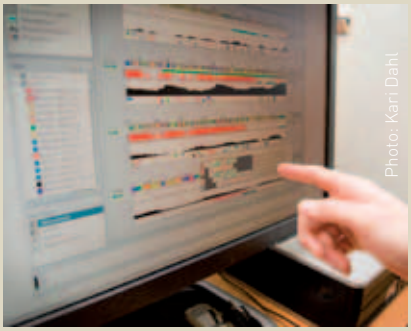
Photo: Kari Dahl

The node was responsible for the national BFYS 2009 meeting (Bioinformatics for Young Scientists) and for the marketing of the platform at the NBS Contact Meeting in 2009. The platform was also involved in organizing a meeting at NTNU on Next Generation Sequencing, with several invited speakers.

In the future there will be increased activity in ultra-high throughput sequencing. There are major bioinformatic challenges associated with handling and analysis of the large data volumes that are generated. The Bioinformatics platform is in dialogue with Notur and Norstore to solve these problems.

THE NORWEGIAN MICROARRAY CONSORTIUM - NMC

The main activity in 2009 has been related to Illumina gene expression and SNP analysis. In 2009, our group has offered an RNA/DNA-in data-out microarray service and a bioinformatics service. More than 2500 samples have been run through our microarray lab service and our service has provided help to approximately 28 lab projects and 28 bioinformatics projects. About 80% of the users of our services were associated with NTNU or St. Olavs Hospital, but we also provided services to users at UiO, UiT and AHus.

The NMC node has received Illumina CSPro (service provider) certification for gene expression and SNP analysis. A new service for RNA isolation from PAXgene blood has been established, in addition to a method for the analysis of partly degraded RNA (Illumina DASL).


Photo: Kari Dahl

The NMC node has been involved in the organization of a PhD course (Mol8003/Mol8004) for 25 students, including lectures and lab for one week. In addition we lectured at two other courses (Mol3006 and Mol3007) and organized a lab course for 25 students.

A new web page for the lab has been established: *http://www.microarray.ntnu.no/index.html*

In 2009 we have had a demand for high throughput sequencing (HTS) technology from several NTNU users. HTS will probably replace some microarray applications in the near future, but unfortunately we have not obtained funding for HTS technology here at NTNU. We hope this can be sorted out and HTS service established in 2010.

THE NORWEGIAN ARABIDOPSIS RESEARCH CENTER - NARC


Photo: iStock

The NTNU Cell and Molecular Biology (CMB) group is host to the Norwegian Arabidopsis Research Centre (NARC), which is one of the microarray nodes associated with the FUGE microarray platform. This node has specialized in the Agilent technology and uses a semi-automated hybridization station, which performs RNA isolation and cultivation of plants in a controlled environment.

BIOBANKS FOR HEALTH – BIOHEALTH NORWAY

The technology platform, Biohealth Norway, is a network of human research biobanks and health surveys that have been established for genetic epidemiological research. Central Norway has a FUGE node associated with this platform.

The FUGE node in Mid-Norway ensures that the DNA material from the HUNT study programmes are stored in a format and in concentrations that enable quick delivery of material from the HUNT surveys. Another important task for the node is to secure and organize the storage of DNA in the automated DNA cold storage.

In addition, the same work is continuously done for samples received from CONOR, which is to be used together with material from the HUNT surveys in major international studies.

For the future it will be important for the node to work with quality assurance in the form of new and better methods linked to increased knowledge. Moreover, further assembly of automated storage and new technology is important to be able to undertake biochemical analysis on a minimum consumption of the biomaterial.

Photo: G.K./NTNU

THE NORWEGIAN MOLECULAR IMAGING CONSORTIUM - NORMIC - SUBCELLULAR INTERACTIONS AND IMAGING

The subcellular interactions and imaging node is a collaboration between the NT faculty and DMF. This year, the part of the node located at DMF has been combined with Department of Cancer Research and Molecular Medicine under the new Acute Heart and Lung Centre built at St. Olavs Hospital. Moreover, a new flow cytometer and optical tweezers were obtained by the Department of Physics, which is an important complement to the microscopy facilities. The department also has brought an internal reflection microscope combined with an atomic force microscope into operation during 2009.

Altogether there have been about 50 users of the node in 2009, both external and internal.

The unique aspect of the "Subcellular Interactions and Imaging" node is that it provides a broad assembly of experimental methods for imaging and for studies of inter-and intramolecular interactions. Some examples of research performed by the node are:

- Atomic force microscopy for the ultrastructure determination of various biopolymers, biopolymer assemblies and dynamic force spectroscopy.
- Fluorescence correlation spectroscopy (FCS) to study interactions between molecules.

For the future the node is working on setting up Image Correlation Spectroscopy (ICS) as an important supplementary tool. This technique provides both spatial and temporal dissolved autocorrelation.

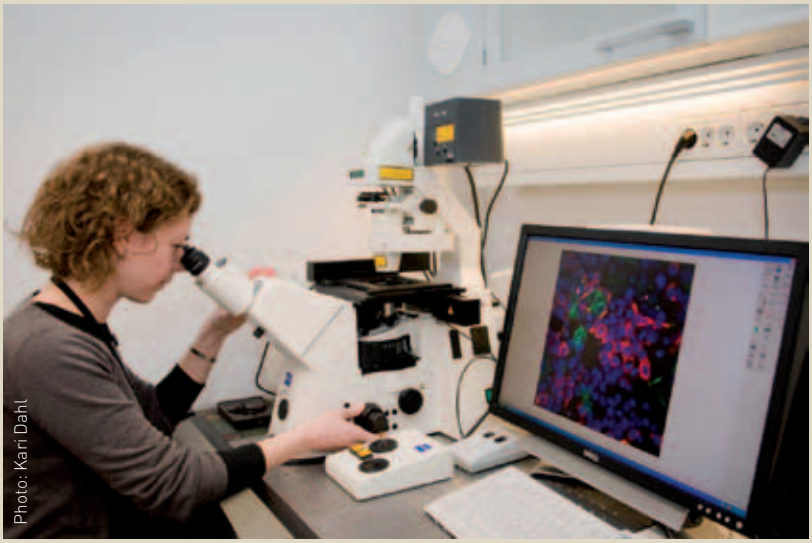
Photo: Kari Dahl

THE NORWEGIAN MOLECULAR IMAGING CENTRE - MIC – WHOLE ANIMAL IMAGING

In 2009, the main activity at the MIC node has been to provide MRIs of animal models of disease (including transgenic animals). The major projects have been:

- Regenerative medicine of nerve damage in the brain
- Tracking of cancer cells
- Water channels (aquaporins) in brain tissue
- Structure and function in medial temporal brain lobe
- The effect of exercise training on diabetes and myocardial infarction
- Does fish feel pain? Nociception in fish
- The quality of fish meat
- Multimodal nanoparticles for targeted cancer imaging
- Therapy evaluation of cytostatic drugs in cancer
- Carbon-13 MR spectroscopy

Methodologically, the focus in 2009 has been on MEMRI (Manganese Enhanced MR Imaging), the tracking of cells labelled with iron oxides, and multimodal (MRI and optical imaging) and target-seeking ("targeted") nanoparticles for imaging.


Photo: Marthe Thuen

Future plans include a new focus area on the use of nanoparticles for imaging, which will include technology research for the optimization of MR sensitivity, the development of multi-modality (MRI, ultrasound and optical methods), an increase in targets ("targeting") against cancer and Alzheimer's disease, and image-guided drug delivery.

Meetings and Seminars

Guest lectures sponsored by FUGE mid-Norway 2009

- Dr Helena Westerdahl, Lund University, Sweden, "RCSA techniques to study genetic diversity in MHC genes in non-model organisms".
- Chris Benedict, LIAI, San Diego, CA, "Cytomegalovirus: a window into innate and adaptive immunity".
- Professor Denis Thieffry, Computational Biology, University of the Mediterranean, Marseille, France, "Qualitative dynamical modelling of cell fate specification".
- Professor Stefano Ciurli, University of Bologna, Italy, "Functional genomics of metal sensing and trafficking: the importance of intrinsic unfolded proteins".
- Dr Lena Wester Rosenlöf, Rostock University, Germany, "Functional genomic strategies to study nuclear and mitochondrial genes associated with complex autoimmune diseases".
- Tor-Kristian Jenssen, Head of Research and Development, PubGene AS, "Manual curation in systems biology - from Curation Tool to Coremine".
- Professor Joakim Lundeberg, School of Biotechnology, KTH – Royal Institute of Technology, Sweden, "Linking genetic markers to disease".
- Professor Benno Schwikowski, Systems Biology Group, Institut Pasteur, Paris, France, "Networks of interacting pathways reflect evolutionary relationships".

Seminars sponsored by FUGE Mid-Norway 2009

- *FUGE workshop 2009*, 27-28 October 2009, - The workshop focused on applications of in vivo small animal MR imaging and spectroscopy, Trondheim, Norway. Arranged by FUGE Molecular Imaging Centre, Trondheim, Department of Circulation and Medical Imaging, Faculty of Medicine, NTNU.
- *FUGE Mid-Norway seminar in Conservation Genomics* at the European Science Foundation (ESF) Conservation Genetics Conference,Trondheim, Norway, 25 May 2009. Arranged by NINA and NTNU.
- *"2nd Seeberg Symposium on DNA Repair"*, 20-25 June 2009, Ålesund/ Geiranger, arranged by Hans Krokan, IKMM, NTNU.
- *NBS Trøndelag høstmøte*, Sælbu, Norway, arranged by NBS Trøndelag.
- *Bioinformatics for young scientists (BFYS) 2009*, Sælbu 24-26 April 2009, arranged by Pål Sætrom.

Information meetings 2009

The FUGE Mid-Norway coordinator held information seminars about FUGE for master's students at the Department of Biology and at the Faculty of Medicine.

Course in application writing

FUGE Mid-Norway invited Knut Røe from Røe Kommunikasjon AS to hold a two day-seminar with a focus on how to write strong grant applications. The main focus of the course was how to write an application that would pique the evaluator's interest. The course had just 5 participants, which provided everyone a great opportunity to get personal feedback on his or her own writing.

The course was structured so that the participants received individual feedback on a personal application soon to be submitted. The participants were given feedback on their applications from both Knut Røe and Stewart Clark, an English translator, and the participants themselves. In addition, an experienced evaluator, Professor Berit Johansen, was invited to the course. She gave the participants the opportunity to ask questions about how an evaluator evaluates an application.

The take-home message of the course was that it is important to start with a strong opening that catches the reader's interest. Thereafter, you can provide the scientific details needed to explain the project.

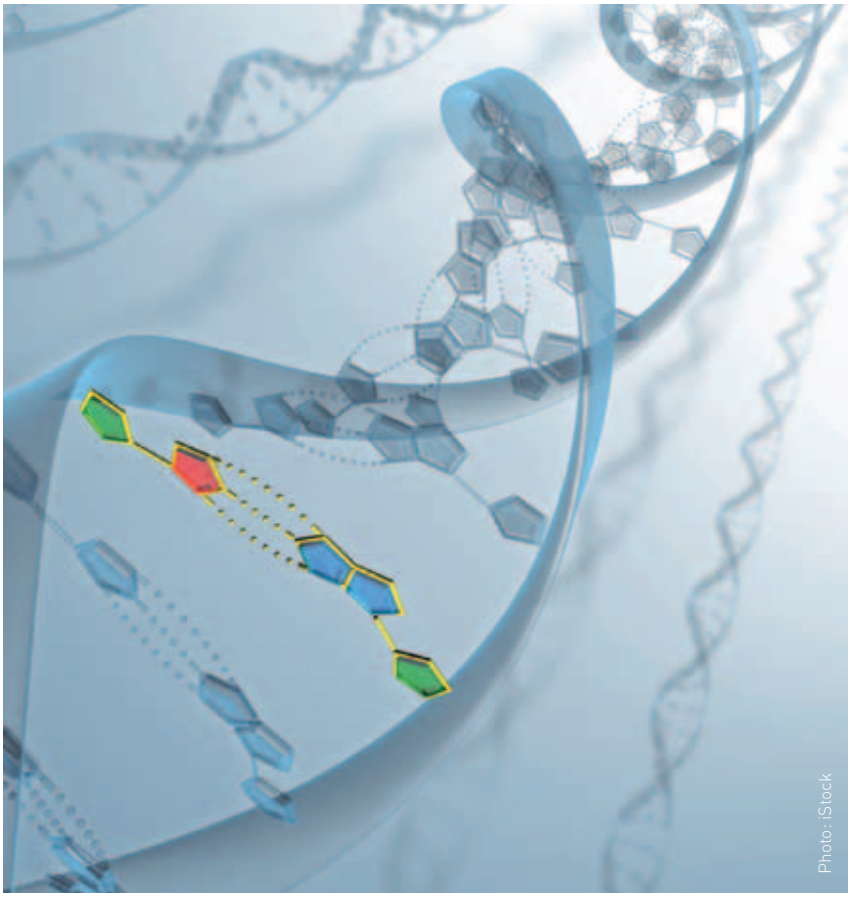

Photo: iStock

Awards

FUGE Mid-Norway
Christmas seminar 2009
Ole Didrik Lærum, professor of pathology from the University of Bergen, opened the seminar with an excellent lecture on research communication. He has always been very engaged with the popularization of research, and received the Norwegian Research Council outreach award in 2008.

Anastasia Dykyy (19 years old) won the Young Scientists Competition in 2009 for a paper on stem cell research. During the Christmas seminar she talked about her experience of participating in the European finals and her research.

Each year FUGE Mid-Norway hands out an award for strong research, which is especially appropriate in Mid-Norway due to the number of functional genomics research projects.

The FUGE Mid-Norway 2009 prize went to postdoctoral candidate Torunn Bruland, Associate Professor Mette Langaas, PhD Clara-Cecilie Günther and PhD candidate Christina Sæten Fjeldbo (see photo) for their work on "Functional studies on transfected cell microarray analysed by linear regression modelling". The award winners received a diploma, a work of art and NOK 50 000 to be used for their research.


Photo: Marianne Sjøholtstrand

"An important part of this work is that it represents a successful collaboration between the biomedical, experimental milieu and a statistically professional community. This is a good inter-disciplinary project," said the jury.

In connection with the award, Christina S. Fjeldbo, one of the laureates, held a presentation about her work published in *Nucleic Acid Research, 35: e97-107, 2008*. After the presentation of the award winners, a Christmas lunch was served.

Other awards given to functional genomics researchers in Mid-Norway in 2009:
- Lars Hagen and Geir Slupphaug, Department of Clinical and Molecular Medicine, were awarded the Vangslund research award in medical technology for 2009.
- Anastasiya Dykyy, 19, from Trondheim, was awarded first prize in the Natural Sciences class in the "Young Scientists 2009" challenge.

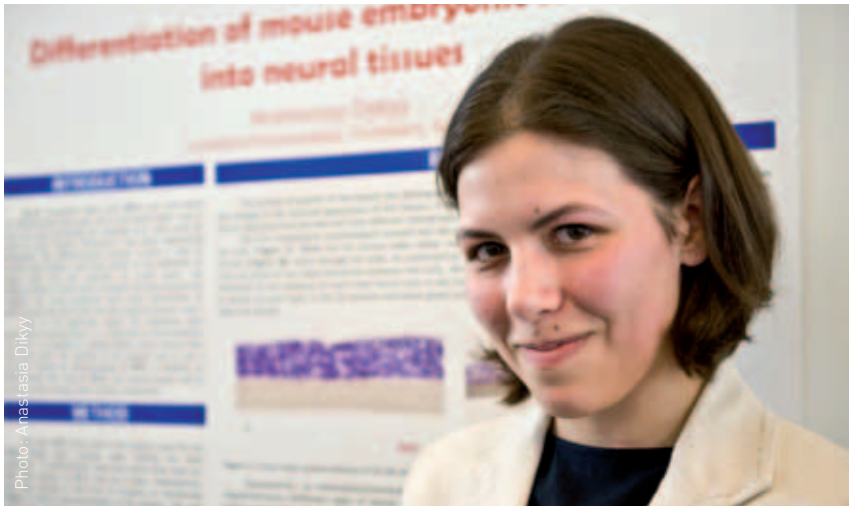
Photo: Anastasia Dikyy

Action Plan

All actions established in the action plan for FUGE Mid-Norway for 2009 were fulfilled. A new action plan for the FUGE committee and board was created for 2010. The plan can be found on our website: *http://www.ntnu.no/fuge/organisasjon*

Seed Funding

Two PhD positions
FUGE Mid-Norway was given two PhD positions from the NTNU SO funds. The PhD positions were announced and made available for all functional genomics researchers at NTNU. An international review panel was set up to review the applications. The positions were given to:

- *Yosuke Kodama*, "Genetic mouse models to study gastric physiology and diseases".
- *Lene Christin Olsen*, "Are stellate cells grid cells? Silencing by microRNA-regulated transgenes can provide the answer".

Postdoc position
FUGE Mid-Norway was given a post-doctoral position from the NTNU SO funds. The post-doctoral positions were announced and made available to all functional genomics researchers at NTNU. An international review panel was set up to review the applications. The position was given to PhD Anna Billing, "The functional genomics of inbreeding depression".

Engineer
In 2008 an engineer position was given to the systems biology research group headed by Martin Kuiper. Vladimir Mironov was appointed to the position for four years. Since the start of Mironov's employment (1/08/08), he has worked with the migration of resources developed by Martin Kuiper's group at Ghent University, Belgium. Now that the transfer of Semantic Systems Biology to NTNU has been completed, the system development has been started at NTNU. Mironov is one of the main architects and engineers of the system, and will be responsible for the refinement and implementation of its development. In addition, Mironov also interfaces with end users.

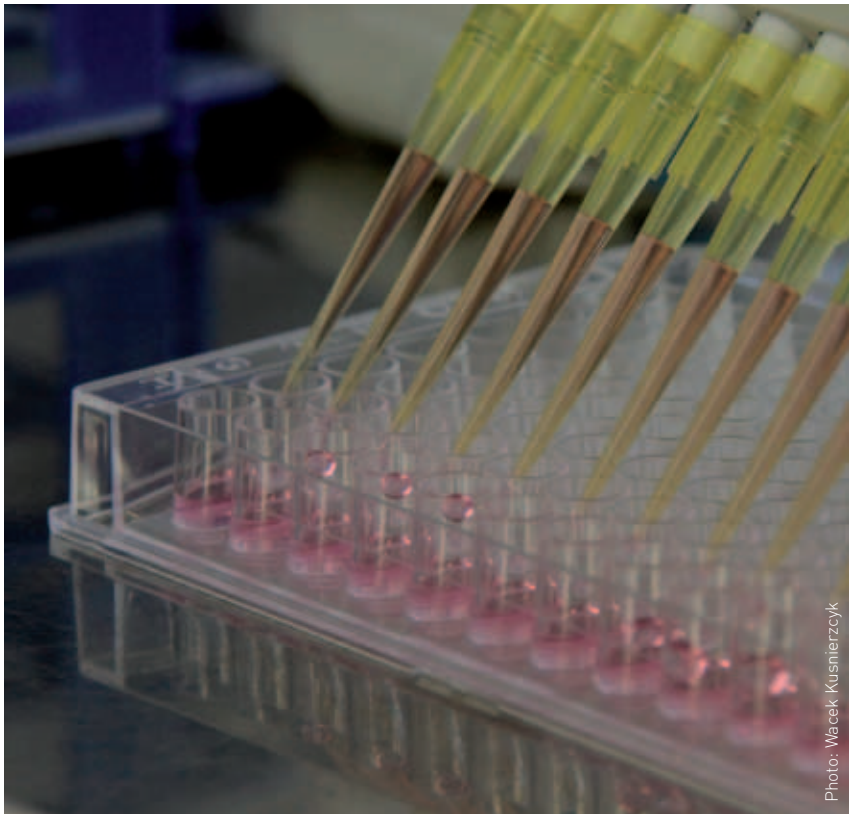
Photo: Wacek Kusnierczyk

Adjunct Professors
Three adjunct professors were employed with the funds given to the programme by the Research Council of Norway:

Professor Ole Nørregaard Jensen, Syddansk Universitet, Denmark.
The DNA repair research group and FUGE NorProteomics at NTNU have an ongoing research collaboration with Jensen. He has contributed with international expertise in quantitative proteomics and PTM analysis. In 2009, two PhD students from the NTNU FUGE proteomics laboratory worked at Jensen's laboratory in Odense to run quantitative SILAC-based proteomic analyses. These data are now being processed. Professor Jensen has also contributed as a lecturer in MOL3007 Functional Genomics.

Professor Eicke Latz, University of Bonn, Germany
Latz works in collaboration with Professor Terje Espevik and his research group at the Department of Cancer Research and Molecular Medicine, NTNU. In 2009, Latz was responsible for and participated in two major joint projects: "Mechanisms of cholesterol-crystal-induced inflammation with relevance to atherosclerosis" and "Rab11a GT-Pase signalling mediated by Toll-like receptor 4". Latz is co-supervisor for Eivind Samstad, a research student for the latter project who also had a research stay at Latz's laboratory. Professor Latz has also contributed to both research and teaching related to the NorMic platform and FUGE.

Professor Jens Nielsen, Chalmers, Sweden.
Nielsen has contributed in the building up of systems biology at the Department of Biotechnology, NTNU. He has been a partner in the Sysmo project and contributed to increased internationalization and

cooperation with research groups in Germany and England. Nielsen has brought new methods to NTNU such as in silico modelling of complex metabolic networks based on genome sequences. Nielsen teaches the PhD course, BT 8102 Molecular and cellular bioinformatics.

Travel grants
Funding from the Research Council of Norway made it possible to announce travel grants in order to support international networking. The grants were awarded to:
- Ane Kjersti Vie / Bin Liu
- Anna Kusnierczyk
- Åsa Borg
- Ishita Ahuja
- Kirsti Kvaløy
- Kristin Nørsett
- Trond Kortner

Funds to use the technology platforms
The FUGE technology platforms offer researchers various services related to specific technologies that are important to functional genomics research.
To facilitate interaction between researchers and the technology platforms, FUGE Mid-Norway allocated money to researchers who planned to collaborate with and use the technology platforms. To that end, the following research grants were awarded:
- Jan Egil Afset
- Bjørn Munro Jenssen
- Hans E. Krokan
- Helena Bertilsson
- Odrun Gerderaas
- Åsa A. Borg
- Jens Rohloff
- Anna Kusnierczyk
- Astrid Lægreid
- Marit W. Anthonsen
- Tore Brembu
- Geir Bjørkøy
- Helga Ertesvåg

Service funds
The technology used in functional genomics research has developed enormously in recent years and the need for maintenance of high-tech instruments has increased. In recent years, FUGE Mid-Norway has come to understand that service agreements are expensive and that there is a need to allocate money for this purpose. We therefore announced the allocation of funds in 2009 for service agreements. The grants were allocated to:
- Atle Bones
  - Service agreement for Agilent scanner for microarrays
- Kristian Hveem
  - Service agreement for Real-time PCR system and the Auto Pure LS
- Geir Slupphaug
  - Service agreement for Typhoon Trio Laser scanner for 2D-PAGE/2D-DIGE
- Arne Sandvik
  - service agreement for Tecan Plus Li-Ha Robot

BIOTEK 2012

The Research Council of Norway (NFR) requested proposals for the definition of the next national investment program for biotechnology, Biotec 2012, in November 2009. FUGE Mid-Norway appointed a Biotek 2012 panel to create several proposals in research areas important to NTNU.

Proposals from all over Norway were published on the Research Council's website after the deadline. NTNU submitted a package of very qualified proposals on health, bioinformatics, systems biology, synthetic biology, white biotechnology, aquaculture, biotechnology and ICT, and ethics.

Work towards a new national investment program for biotechnology in Norway will continue in 2010.

PhDs Awarded

The following candidates have successfully defended their theses *in 2009* for a PhD degree at NTNU in functional genomics:

Elvar Eyjolfsson: 13 C NMRS of animal models of schizophrenia

Håkon Hov: HEPATOCYTE GROWTH FACTOR AND ITS RECEPTOR C-MET. AUTOCRINE GROWTH AND SIGNALING IN MULTIPLE MYELOMA CELLS

Ida G. Aursand: Low-field NMR and MRI studies of fish muscle. Effects of raw material quality and processing.

Ingvild Bjellmo Johnsen: INTRACELLULAR SIGNALING MECHANISMS IN THE INNATE IMMUNE RESPONSE TO VIRAL INFECTIONS

Jens Erik Slagsvold: N-3 POLYUNSATURATED FATTY ACIDS IN HEALTH AND DISEASE – CLINICAL AND MOLECULAR ASPECTS

Jens Erik Slagsvold: N-3 polyunsaturated fatty acids in health and disease.

Kristine Misund: A STUDY OF THE TRANSCRIPTIONAL REPRESSOR ICER. REGULATORY NETWORKS IN GASTRIN-INDUCED GENE EXPRESSION

Linda Tømmerdal Roten: GENETIC PREDISPOSITION FOR DEVELOPMENT OF PREEMCLAMPSIA – CANDIDATE GENE STUDIES IN THE HUNT (NORD-TRØNDELAG HEALTH STUDY) POPULATION

Maria Radtke: ROLE OF AUTOIMMUNITY AND OVERSTIMULATION FOR BETA-CELL DEFICIENCY. EPIDEMIOLOGICAL AND THERAPEUTIC PERSPECTIVES

Nina K. Reitan: Methods for studying critical barriers to the delivery of nanomedicine. The potential of fluorescence correlation spectroscopy, confocal microscopy and MRI.

Ronny Myhre: GENETIC STUDIES OF CANDIDATE GENE3S IN PARKINSON'S DISEASE

Thea Kristin Våtsveen: GENETIC ABERRATIONS IN MYELOMA CELLS

Tonje Strømmen Steigedal: MOLECULAR MECHANISMS OF THE PROLIFERATIVE RESPONSE TO THE HORMONE GASTRIN

Torkild Visnes: DNA EXCISION REPAIR OF URACIL AND 5-FLUOROURACIL IN HUMAN CANCER CELL LINES

Trude Teoline Nausthaug Rakvåg: PHARMACOGENETICS OF MORPHINE IN CANCER PAIN

Publications

A full list of authors can be found at: *www.ntnu.no/research/fuge/news*

Ahmed, S., et al. Newly discovered breast cancer susceptibility loci on 3p24 and 17q23.2. *Nat Genet* **41**, 585-590 (2009).

Andersen, S. & Skorpen, F. Variation in the COMT gene: implications for pain perception and pain treatment. *Pharmacogenomics* **10**, 669-684 (2009).

Aursand, I.G., *et al.* Water and Salt Distribution in Atlantic Salmon (Salmo salar) Studied by Low-Field H-1 NMR, H-1 and Na-23 MRI and Light Microscopy: Effects of Raw Material Quality and Brine Salting. *J Agr Food Chem* **57**, 46-54 (2009).

Bak, L.K., *et al.* Neuronal glucose but not lactate utilization is positively correlated with NMDA-induced neurotransmission and fluctuations in cytosolic Ca2+ levels. *J Neurochem* **109**, 87-93 (2009).

Beisvag, V., *et al.* Pathological and physiological hypertrophies are regulated by distinct gene programs. *Eur J Cardiov Prev R* **16**, 690-697 (2009).

Berg, B.G., Schachtner, J. & Homberg, U. gamma-Aminobutyric acid immunostaining in the antennal lobe of the moth Heliothis virescens and its colocalization with neuropeptides. *Cell Tissue Res* **335**, 593-605 (2009).

Dam, T., *et al.* Carbohydrate-Carbohydrate Trans Interactions in the A-Galnac (Tn-Antigenic) form of Porcine Submaxillary Mucin. *Glycobiology* **19**, 1324-1325 (2009).

Gilljam, K.M., *et al.* Identification of a novel, widespread, and functionally important PCNA-binding motif. *J Cell Biol* **186**, 645-654 (2009).

Gimmestad, M., *et al.* Characterization of Three New Azotobacter vinelandii Alginate Lyases, One of Which Is Involved in Cyst Germination. *J Bacteriol* **191**, 4845-4853 (2009).

Gudbjartsson, D.F., *et al.* A sequence variant in ZFHX3 on 16q22 associates with atrial fibrillation and ischemic stroke. *Nature Genetics* **41**, 876-878 (2009).

Haberg, A.K., *et al.* Acute changes in intermediary metabolism in cerebellum and contralateral hemisphere following middle cerebral artery occlusion in rat. *J Neurochem* **109**, 174-181 (2009).

Iversen, A.C., *et al.* A proviral role for CpG in cytomegalovirus infection. *J Immunol* **182**, 5672-5681 (2009).

Johnsen, I.B., *et al.* The Tyrosine Kinase c-Src Enhances RIG-I (Retinoic Acid-inducible Gene I)-elicited Antiviral Signaling. *J Biol Chem* **284**, 19122-19131 (2009).

Kondziella, D., *et al.* Gray Matter Metabolism in Acute and Chronic Hydrocephalus. *Neuroscience* **159**, 570-577 (2009).

Kong, A., *et al.* Parental origin of sequence variants associated with complex diseases. *Nature* **462**, 868-U859 (2009).

Landi, M.T., *et al.* A Genome-wide Association Study of Lung Cancer Identifies a Region of Chromosome 5p15 Associated with Risk for Adenocarcinoma. *Am J Hum Genet* **85**, 679-691 (2009).

Langevin, C., *et al*. Human Immunodeficiency Virus Type 1 Vpr Modulates Cellular Expression of UNG2 via a Negative Transcriptional Effect. *J Virol* **83**, 10256-10263 (2009).

Lund, T.M., *et al*. Availability of neuro-transmitter glutamate is diminished when beta-hydroxybutyrate replaces glucose in cultured. *J Neurochem* **110**, 80-91 (2009).

Maurstad, G., *et al.* Dehydration stability of amyloid fibrils studied by AFM. *Eur Biophys J Biophy* **38**, 1135-1140 (2009).

Nymark, M., *et al.* An integrated analysis of molecular acclimation to high light in the marine diatom Phaeodactylum tricornutum. *Plos One* **4**, e7743 (2009).

Palsson-McDermott, E.M., *et al.* TAG, a splice variant of the adaptor TRAM, negatively regulates the adaptor MyD88-independent TLR4 pathway. *Nat Immunol* **10**, 579-586 (2009).

Reitan, N.K., *et al.* Characterizing DNA Condensation by Structurally Different Chitosans of Variable Gene Transfer Efficacy. *Biomacromolecules* **10**, 1508-1515 (2009).

Risa, O., *et al.* Quantification of amounts and C-13 content of metabolites in brain tissue using high-resolution magic angle spinning C-13 NMR spectroscopy. *Nmr Biomed* **22**, 266-271 (2009).

Roe, O.D., *et al.* Genome-wide profile of pleural mesothelioma versus parietal and visceral pleura: the emerging gene portrait of the mesothelioma phenotype. *Plos One* **4**, e6554 (2009).

Salanti, G., *et al.* Underlying Genetic Models of Inheritance in Established Type 2 Diabetes Associations. *Am J Epidemiol* **170**, 537-545 (2009).

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Sandanger, O., *et al*. IL-10 Enhances MD-2 and CD14 Expression in Monocytes and the Proteins Are Increased and Correlated in HIV-Infected Patients. *J Immunol* **182**, 588-595 (2009).

Setubal, J.C., *et al*. Genome Sequence of Azotobacter vinelandii, an Obligate Aerobe Specialized To Support Diverse Anaerobic Metabolic Processes. *J Bacteriol* **191**, 4534-4545 (2009).

Shi, Q.L., *et al.* Mild reduction in the activity of the alpha-ketoglutarate dehydrogenase complex elevates GABA shunt and glycolysis. *J Neurochem* **109**, 214-221 (2009).

Slagsvold, J.E., *et al.* The Antiproliferative Effect of EPA in HL60 Cells is Mediated by Alterations in Calcium Homeostasis. *Lipids* **44**, 103-113 (2009).

Sletmoen, M., *et al*. Single-Molecule Pair Studies of the Interactions of the alpha-GalNAc (Tn-Antigen) Form of Porcine Submaxillary Mucin with Soybean Agglutinin. *Biopolymers* **91**, 719-728 (2009).

Sletmoen, M., *et al.* Structure and stability of polynucleotide-(1,3)-beta-D-glucan complexes. *Carbohyd Polym* **76**, 389-399 (2009).

Snipstad, K., *et al.* New specific molecular targets for radiochemotherapy in colorectal cancer. *Febs J* **276**, 121-121 (2009).

Stolen, T.O., *et al.* Interval Training Normalizes Cardiomyocyte Function, Diastolic Ca2+ Control, and SR Ca2+ Release Synchronicity in a Mouse Model of Diabetic Cardiomyopathy. *Circ Res* **105**, 527-U547 (2009).

Storvold, G.L., *et al.* Docosahexaenoic Acid Activates Some SREBP-2 Targets Independent of Cholesterol and ER Stress in SW620 Colon Cancer Cells. *Lipids* **44**, 673-683 (2009).

Takemasa, M., *et al*. Single Molecular Pair Interactions between Hydrophobically Modified Hydroxyethyl Cellulose and Amylose Determined by Dynamic Force Spectroscopy. *Langmuir* **25**, 10174-10182 (2009).

Thomas, G., *et al.* A multistage genome-wide association study in breast cancer identifies two new risk alleles at 1p11.2 and 14q24.1 (RAD51L1). *Nature Genetics* **41**, 579-584 (2009).

Thuen, M., *et al.* Combination of Mn(2+)-enhanced and diffusion tensor MR imaging gives complementary information about injury and regeneration in the adult rat optic nerve. *J Magn Reson Imaging* **29**, 39-51 (2009).

Veliyulin, E., *et al.* Quantitative Na-23 Magnetic Resonance Imaging of Model Foods. *J Agr Food Chem* **57**, 4091-4095 (2009).

Visnes, T., *et al.* Uracil in DNA and its processing by different DNA glycosylases. *Philos T R Soc B* **364**, 563-568 (2009).

Wideroe, M., *et al*. Manganese-enhanced magnetic resonance imaging of hypoxic-ischemic brain injury in the neonatal rat. *Neuroimage* **45**, 880-890 (2009).

Yeager, M., *et al.* Identification of a new prostate cancer susceptibility locus on chromosome 8q24. *Nature Genetics* **41**, 1055-1057 (2009).

Zhao, X.C. & Berg, B.G. Morphological and Physiological Characteristics of the Serotonin-Immunoreactive Neuron in the Antennal Lobe of the Male Oriental Tobacco Budworm, Helicoverpa assulta. *Chem Senses* **34**, 363-372 (2009).

Aas, P.A., *et al.* Overexpression of transcription factor AP-2 stimulates the P-A promoter of the human uracil-DNA glycosylase (UNG) gene through a mechanism involving derepression. *DNA Repair* **8**, 822-833 (2009).

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NTNU
NO-7491 Trondheim, Norway
Phone: + 47 73 59 50 00
Fax: + 47 73 59 53 10
www.ntnu.no

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