

# OSLO BIO UPDATE

A newsletter from Oslo Teknopol covering activities in the life science cluster in the Oslo region

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## NORWAY’S BIOTECH SECTOR

# SHOWS ITS STRENGTH IN RISK-AVERSE TIMES

**Biotechnology and risk are synonymous. Now, with the rising price of natural resources and the credit crunch unsettling the financial markets the sector is feeling the pinch as risk-averse investors pull out.**

But with oil prices at an all time high, Norway as the world’s third largest oil and gas exporter is relatively immune to the shock that is hitting the world’s developed economies. This has significant repercussions for the health of the biotechnology sector, as demonstrated by the fact that Norway is a member of the elite club of just two European countries where there has been a biotech initial public offering in the shuttered market of 2008.

The Norwegian biotechnology sector now comprises over 100 companies specialising in fields ranging from diagnostics to marine bioprospecting and therapeutics to cleantech. They may be relatively small, but the impressive element is the huge diversity of fascinating and leading edge science Norway’s biotechs are working to commercialise.

Take **Spermatech AS**, for example, which is developing a non-hormonal male contraceptive pill based on discoveries made by Norwegian and American scientists of how sperm motility is regulated. Highlighting the international outlook of Norway’s



Norway is leading in two of the most exciting areas of drug discovery research - cancer stem cells and marine bioprospecting. Major international conferences on both are planned for 2009.



Photo: UMPhoto.no/Erling Svendsen

Photo: The Norwegian Cancer Stem Cell Innovation Center (CAST)

biotechs, the company has in-licensed the US intellectual property from the University of Massachusetts Medical School to build a single patent portfolio. Funded by grants from the Research Council of Norway and seed funding from private investors, Spermatech is currently carrying out a high throughput screening programme to find hits and develop leads against its novel target.

Spermatech's programme is some three years from the clinic, but a Norwegian biotech with a more advanced portfolio is **Santosolve AS**, which is developing topically-applied pain killers based on nonradioactive strontium. As the active ingredient in Sensodyne toothpaste there is a long-term safety record in a large population, but strontium's analgesic and anti-inflammatory properties have not been exploited in other areas. Santosolve recently completed a fourth Phase II study in the treatment of pain caused by osteoarthritis, and believes the product could avoid the side effects of traditional and COX-2 antiinflammatory treatments in this indication.

**Orthogenics AS**, another specialist working in osteoarthritis, was founded in 1999 around a new hypothesis which says the disease is caused by an infectious agent. The company is developing a diagnostic that it believes will enable the disease to be identified sooner than is possible at present, leading to improved treatments.

Meanwhile, **Inivosense AS** is developing highly sensitive cancer diagnostics based on biosensor technology that use fibre optics and biopolymer smart gels to detect cancers in situ. Unlike current methods that involve taking biopsies and then waiting for a laboratory analysis the systems can detect very small amounts of cancer in various parts of the body within minutes. The first product, for measuring prostate specific antigen in situ, is expected to reach the market this year following trials in Norway and the UK.

Bioprocessing is a significant subsector, which is supported by Probio, a national bioprocessing research effort funded by the Research Council of Norway. One recent start-up **Plastid AS**, has bravely entered a field where a number of other biotechs have failed, that of producing therapeutic proteins in plants. The company was set up in November 2007, as the first biotech spin out from the University of Stavanger, to commercialise new techniques for directing the expression of proteins in plastids.

Norway has representatives in most of the leading edge areas of biotechnology. In the hot field of small interfering RNA is **siRNAsense AS**, which is applying its technology to inhibit the expression of proteins that are upregulated in cancer and neurodegenerative diseases. The company's first candidate drug targets angiogenesis.

siRNAsense is among the 40 members of the **Oslo Cancer Cluster**, an informal network set up to support and speed up the translation of academic, clinic and industrial research into marketed therapies and diagnostics. The Cluster was awarded Centres of Expertise status by the government in June 2007, providing long-term funding. By the end of 2007 there were 44 projects in the pipelines of members

of the Cluster. Norway is also a world leader in marine biotechnology and bioprospecting. The country's fjords and coastal waters have yielded a wealth of novel enzymes, anti-cancer and anti-microbial compounds. The research is supported by MabCent - the Centre for Marine Bioactives and Drug discovery, which opened last year at Trondheim University.

MabCentre is home to a marine biobank and associated screening platforms, and is working in collaboration with companies in the area including **Lytix Biopharma**, **Biotec Pharmacon**, **Probio Nutra-ceutical** and **Pronova Biopharma**.

Norway's biotechnology industry features a strong subsector specialising in a broad range of novel drug delivery technologies. Consider **OptiNose**, which has developed nasal drug delivery devices for liquids and powders that facilitate administration of drugs directly from the nose to the brain, as well as improved systemic and topical delivery. The OptiNose breath-actuated and breath powered devices are uniquely able to target specific regions of the nasal cavity, including the sinuses and the olfactory region, without risk of the lung deposition of existing, nasal inhalers, sprays or nebulizers. The company completed several Phase I and II studies demonstrating the great potential of the technology and OptiNose is due to announce excellent Phase II results for a nasal migraine trial in June at the American Headache Society meeting in Boston.



A further innovative approach to improving the delivery of existing drugs is being developed by **EpiTarget AS**, which has a method for encapsulating chemotherapeutics in ultrasound-sensitive liposome coatings. These entities accumulate in cancerous cells and not elsewhere in the body. When ultrasound is applied they split open, releasing the drug payload, with the ultrasound shock waves providing the impetus to distribute the drug molecules throughout the tumour.

Last month Epitarget raised NOK 4.85 million (\$ 959,300) in a private round supported by The Norwegian Radium Hospital Research Foundation, MP Pensjon, Investor Venture IKS, and Holbergfondene. The money will enable the company to complete several animal studies over the remainder of 2008, including the first proof-of-principle study.

Another company working to commercialise a novel drug delivery technology is **PCI Biotech**, which this month sealed independence from its parent company Photocure, when it became only the second European company to list on a public market in 2008. PCI is adapting the photodynamic therapy technology developed by Photocure to deliver existing chemotherapy drugs. The method, called photochemical internalisation, involves the light-directed delivery of chemotherapeutics to tumour cells, where they cross the cell membrane by endocytosis. This internal delivery mechanism is expected to enhance the efficacy of existing drugs and could also be used for emerging treatments, such as gene therapy using siRNA.

PCI biotech is listing in June on the junior market of the Oslo Stock Exchange, Oslo Axess, which was set up a year ago to cater for start-ups and smaller companies that are not mature enough to get a full listing. A fellow biotech on the market is **Invivosense**.

According to Ernst & Young's 2007 Global Biotech Report, published last month, Norway ranks 13th in Europe in terms of its overall pipeline. Of these, more than half are in Phase II and Phase III. Biotechnology in Norway is based on very strong foundations both in the wider economy, and in factors such as the education and research system. The government has set the target of increasing investment in R&D to 3 percent of GDP by 2010, and within this increased investment biotechnology has been singled out as one of three key technology areas, along with ICT and new materials and nanotechnology.

Apart from increasing its own contribution, the government is encouraging companies to invest in R&D through the Skattefunn-system of R&D tax credits. These were introduced in 2002, and an international benchmarking study published in January this year showed it is the most efficient such scheme, with companies investing two kroner for every one put in by the government.

The biotech sector has strong local support in the Norwegian Bio-industry Association, which is active in EuropaBio and an affiliate member of BIO. Norway is also a prominent member of Scanbalt, the biotechnology metaregion that unites 11 neighbouring countries to bring economies of scale to the development of the sector.

In many respects, Norway defies conventional economic thinking. It has a large public sector with accompanying high taxes and high prices, and a compressed wage structure, which is usually said to reduce the incentive for hard work. Yet along with its fellow Nordic states, Norway boasts productivity well above the OECD average. While Norway's biotech sector may not be fully mature, it too has the building blocks it needs to grow and prosper.

*Nuala Moran is a leading biotech commentator, European editor of BioWorld and regular contributor a wide range of journals including Nature and the FT.*



Bjarte Reve and Jonas Einarson are delighted the OCC concept has already gained widespread interest in both Europe and the US.

## OSLO CANCER CLUSTER - ONE YEAR ON

**Celebrating its first anniversary at BIO, the Oslo Cancer Cluster (OCC) is already well on the road to realizing its vision 'to transform world class cancer research into new cancer diagnostics and treatment and thereby improve the lives of cancer patients'.**

**OCC will have a big presence at the BIO Convention in San Diego this month, with a Round Table session with big pharma, and several posters on display.**

OCC is a unique partnership between industry, research institutions, government and, now, the Norwegian Cancer Society. Its history can be traced back to the beginning of the Radium Hospital Research Foundation, which was set up in 1986 to commercialize cancer research emerging from the Radium Hospital and set the scene for the further development of the biotech sector in Norway. In 2006, the Government decided to enhance innovation and internationalization by launching its Centres of Expertise (NCE) program, consisting of clusters of world class enterprise with strong collaboration between companies, R&D, educational establishments and the public sector. In June 2007, OCC gained NCE status - a development which should strongly support its desire to succeed as an innovative cluster for cancer diagnostics and treatment in Europe.



The new Science Park on the Montebello campus will act as a focus for Oslo Cancer Cluster activities and in an innovative move also house a life sciences high school.

According to CEO Bjarte Reve, the first year has seen major progress: *“Already we are attracting interest from potential collaborators in both the US and Europe and have in recent weeks achieved another two of our initial objectives. The new research park/high school is to go ahead and we have launched an enhanced Phase I/II oncology trials service.”*

OCC now has 40 members: six global pharma companies, nine Norwegian listed biotech companies, 16 Norwegian biotech start-ups, seven R & D facilitators. New members for 2008 are: The Norwegian Cancer Society, The Radium Hospital, the Institute for Cancer Research, Ullevål University Hospital and Swedish Orphan AS. This last new member indicates the scope of OCC – it includes the rest of Norway, and the Nordic region. Membership applications from suppliers are also now being considered. OCC’s turnover is 5.7 billion NOK, its R & D budget is 1.0 billion NOK, it has 1,600 employees and 44 oncology projects in development.

OCC wishes to put into practice various lessons learned from biotech clusters in the United States, namely:

- Research and commercialization are key elements in growing a successful biotechnology industry cluster
- Biotechnology is highly concentrated within those metropolitan areas that combine a strong research capacity with the ability to convert research into substantial commercial activity
- The availability of venture capital and local entrepreneurship is a critical factor in order to succeed as a biotech cluster

(Source: Signs of Life: The Growth of Biotechnology Centers in the U.S. The Brookings Institution Center on Urban and Metropolitan Policy, 2002)

Meanwhile, AstraZeneca carried out a survey of more than 70 hospitals and research organizations in Europe in 2004 and 2005 and named 12 preferred partners, as a result. The Radium Hospital is the only one of these situated in the Nordic countries.

AstraZeneca has supported OCC from the start because it meets the company’s need to have access to a range of biotech competences, rather than just buying up individual companies. This, explains Henrik Lund, VP Clinical Development for AZ’s subsidiary companies, is the trend for pharma today, both in the US and in Europe. OCC has everything – small biotechs, academia and larger companies approaching IPOs. *‘We like this,’* he says. *‘That is why we got in here early and provided some infrastructure and pro bono work. The Cluster resonates well with the whole area of biotech and pharma interaction.’* He expects that OCC will lead to the development of some very good ideas for AstraZeneca. Furthermore, he believes that the existence of OCC allows for more tangible interactions between big pharma and smaller companies – as will be evident at the BIO meeting, for example. *‘A cluster is a more attractive customer for big pharma than an individual company – so the threshold for creating an interaction is lowered at a time when so many small companies are trying to get attention,’* he explains. Lund also believes it is within big pharma’s corporate responsibility remit to get involved in initiatives like OCC. Since AstraZeneca is a big player in the oncology market, they therefore want to support what OCC is doing.”

For more information visit [www.oslocancercluster.org](http://www.oslocancercluster.org)

# POTENTIAL FOR MAJOR GROWTH

IN NORWEGIAN BIOTECH

**A recent report from the Boston Consulting Group made for the Norwegian Association of Pharmaceutical Manufacturers, shows a huge potential for growth in the biotech sector in Norway. There is untapped potential related to translating the ideas, technologies, and capabilities coming out of Norwegian biopharma research into more commercial value creation, is the primary conclusion of the report. If Norway manages to play its cards right, the whole sector could increase its total turnover to over 80 billion NOK by 2015. Today the turnover is merely 6 billion NOK.**

The report shows that Norway has high quality and relevance in the research performed, but lacks the commercial infrastructure to create products from this research. Also Norway has a high number of scientific publications in health related biotech, but a low rate of patenting compared to other countries.

To realize this potential the report suggests closer collaboration and a consensus on ambition between all the players in the sector; research institutions, hospital sector, industry, Innovation Norway and the Research Council. Also there is a need for more incentives geared towards R&D-based companies, improved collaboration between key actors and strengthened protection of intellectual property rights.

Photo: Corbis-CD



Initiatives such as FUGE are ensuring Norway has a strong modern life sciences research infrastructure

## LYTIX SPLITS

Lytix Biopharma is to form a separate company Lytix Oncology to take forward into clinic its lead anti-cancer molecule based on synthetic lytic peptides. More at [www.lytixbiopharma.com](http://www.lytixbiopharma.com)

## SERODUS PHARMA SUCCESSFULLY INCUBATED BY BMI

BMI today announced that it has successfully spun out its first "incubated" project as a fully-fledged biopharma company. Serodus Pharma is now scheduled to take its lead candidate product the 5-HT4 receptor antagonist piboserod (SB 207266) for treating heart failure into Phase IIB clinical trials in autumn 2008. At the same time BMI also made two important strategic moves to replace Serodus and strengthen its future pipeline. Firstly BMI has acquired the Radium Research Foundation's oncology company portfolio and secondly it has signed an exclusive agreement to manage spinout companies from hospitals in the greater Oslo region.

Read more at [www.bmioslo.com](http://www.bmioslo.com)

## PCI BIOTECH RAISES NOK 60 MILLION IN OFFERING

PCI Biotech Holding ASA, the Norwegian drug delivery company with a focus on cancer therapeutics, today announced the successful closing of its initial public offering in connection with the listing of the PCI Biotech Holding ASA shares on Oslo Axess (the Share Issue). The offering price was NOK 20 per share. Gross proceeds amounted to NOK 60 million (Approximately USD 11.9 million). PCI Biotech Holding ASA shares are expected to begin trading on the Oslo Axess (ticker: PCIB) on Wednesday 18 June 2008.

Read more at [www.pcibiotech.no](http://www.pcibiotech.no)

## AXIS-SHIELD NYCOCARD CRP TEST SELECTED FOR MAJOR STUDY INTO OVERUSE OF ANTIBIOTICS

Axis-Shield's NycoCard™ CRP (C-Reactive Protein) test is to be used in a major study to identify patients suitable for treatment with antibiotics. The overall aim of the intervention programme is to lower the occurrence of bacterial resistance by reducing the prescription of unnecessary antibiotics for respiratory tract infections, many of which are of viral origin not treatable with conventional antibiotics. The use of CRP testing in Northern Europe to differentiate between bacterial and viral infections in primary care has been widespread and this has contributed to a traditionally low rate of antibiotic resistance. In Southern Europe, where CRP usage is minimal, the prevalence of pneumococci resistant to penicillin is much higher and in Spain, rates of resistance in the region of 40-65% have been reported.

## NORDIAG EXPANDS COLABORATION WITH EXACT SCIENCES FOR JOINT DEVELOPMENT OF COLORECTAL CANCER SCREENING TECHNOLOGIES

NorDiag recently announced a new collaboration agreement with EXACT Sciences for the joint scientific development of an automated nucleic acid sample purification system from stool samples for the screening and early diagnosis of colorectal cancer.



## METVIX TO BE REIMBURSED IN SWEDEN

Photocure has reported that the Pharmaceutical Benefits Board in Sweden (LFN) has decided that Metvix photodynamic therapy (PDT) shall be fully reimbursed for premalignant skin cancer (actinic keratosis (AK)) non-melanoma skin cancer and Bowen's disease. Metvix PDT is an effective non-invasive treatment approved for the treatment of certain cancerous and precancerous skin lesions and registered in approximately 30 countries worldwide, including the majority of European countries, Australia and New Zealand.

For more information visit [www.photocure.com](http://www.photocure.com)

Photo: Photocure



## DIAGENIC TO LAUNCH BREAST CANCER TEST IN INDIA WITH RANBAXY

DiaGenic ASA and SRL Ranbaxy Ltd. have signed a commercial agreement to commence marketing DiaGenic's breast cancer test in India. The test offers a unique set of advantages over existing diagnostic methods. The use of venous blood as the test sample is both discreet and patient friendly. The DiaGenic test detects breast cancer in pre-menopausal women with good accuracy whereas mammography is problematic due to higher breast density in

younger women, which obscures the mammographic image. This is especially important in India, where breast cancer is seen at a significantly lower age than in Western countries. Finally, the disease itself, if present, can be discovered at an early stage, thus paving the way for effective intervention and improved survival rates in affected women. Sanjeev K. Chaudhry, CEO of SRL Ranbaxy predicts high demand for the DiaGenic test, "Awareness of breast cancer is growing in India and we believe the DiaGenic test will provide the perfect incentive for women to take charge of their health and undergo regular check-ups."

## AFFITECH SPOTS ANOTHER WINNER FOR PEREGRINE

Affitech AS, the human antibody therapeutics company announced recently another successfully completed milestone in its longterm antibody discovery partnership with Peregrine Pharmaceuticals (Nasdaq: PPHM). At the 2008 Annual Meeting of the American Association for Cancer Research (AACR), Peregrine presented pre-clinical studies demonstrating that PGN635, a new fully human antibody discovered by Affitech, shows similar anti-tumour efficacy to bavituximab, its lead anti-phosphatidyserine (anti-PS) candidate. "These excellent results mark another milestone in our collaboration with Peregrine and our ability to discover fully human antibodies with excellent properties. They follow our recent announcement on R84, a fully human anti-VEGF antibody that we have also identified for Peregrine which is as effective as Avastin in preclinical trials," comments Martin Welschof, CEO of Affitech. "We are building a strong track record of delivering on this and are other major discovery and development collaborations. In addition our own oncology pipeline is progressing according to schedule."

Read more at [www.affitech.com](http://www.affitech.com)



Photo: DiaGenic

DiaGenic uniquely use peripheral blood as the sample material for their new early breast cancer test about to be launched in India.

# ALGETA

Algeta is a cancer therapeutics company based in Oslo, Norway. Here CEO Thomas Ramdal runs through the company's exciting prospects for lead product Alpharadin which is based on alpha emitters.



Dr. Thomas Ramdahl,  
President & CEO, Algeta

## WHAT IS ALGETA'S BACKGROUND?

Our lead product Alpharadin has demonstrated a positive survival benefit in a phase II clinical study in patients with hormone-refractory prostate cancer (HRPC). Data from this trial were presented during 2007 at leading international conferences (ASCO and ECCO) and published in the July 2007 issue of *Lancet Oncology*.

Based on these excellent results, we plan to enter the first patient into a phase III clinical trial for Alpharadin targeting bone metastases resulting from HRPC very soon.

Alpharadin is a new radiopharmaceutical based on Radium-223, which is an alpha particle emitter. Algeta's expertise and focus is on developing new, targeted cancer therapeutics that harness the unique characteristics of alpha emitters, which are potent, welltolerated and convenient to use.

We are also developing a pipeline of targeted radiopharmaceuticals based on Radium-223 and other alpha emitters for a range of metastatic and disseminated cancer types for which there remains substantial unmet medical need.

Algeta was established in 1997 based on expertise in radiation chemistry, nuclear medicine and clinical oncology, and listed on the Oslo Stock Exchange in March 2007.

## TELL ME MORE ABOUT ALPHARADIN.

Alpharadin is our lead product and is a novel bone-seeking radiopharmaceutical based on Radium-223. It is a unique targeted treatment for bone metastases in cancer patients.

An estimated 1.5 million patients worldwide suffer with bone metastases and approximately 300,000 new cases are diagnosed per year. Prostate and breast cancers account for more than 80% of all cases. Median survival for patients is three years and there are few effective therapies on the market.

Our phase II clinical data show that Alpharadin is safe to use and can significantly increase life expectancy in men with HRPC.



- Headquartered in Oslo, Algeta draws on leading research at the city's Radium Hospital.

We have also seen a lot of interest from key opinion leaders in the area and this gives us confidence that there is medical demand for and acceptance of our unique approach to treating HRPC. We plan to commence phase III trials imminently, based on these results and views. Earlier this year we were delighted to receive an IND approval that enables us to commence clinical development of Alpharadin in the USA. Furthermore, we continue to make good progress in a series of preclinical studies intended to further increase our understanding of the potential therapeutic applications of Alpharadin.

## WHAT IS THE TECHNOLOGY BEHIND ALPHARADIN AND ALGETA?

Alpha particle emitters are among the most potent sources for the lethal irradiation of tumor cells and metastases. A crucial clinical advantage of alpha emitters is that, when targeted appropriately, they exert their cancer cell-killing effect with minimal damage to surrounding normal tissues owing to their very short range of only a few cell diameters and high energy.

There are approximately 100 known alpha emitters of which only a few are considered useful for therapeutic purposes, including Radium-223 and Thorium-227. The selection of an alpha emitter for clinical use is based on its ease and cost-effectiveness of production, and the half life of the primary isotope and its daughter isotopes, which have implications in shipping, handling, administration, excretion and disposal.

## HOW DO YOU TARGET AN ALPHA EMITTER TO A TUMOR?

Alpharadin naturally seeks out the sort of active bone growth you would expect to see in a bone metastasis. This is because radium is similar to calcium and is actively incorporated at the specific sites of new bone formation. Alpharadin, therefore, has



Algeta is one of the growing number of biopharma companies listing on the Oslo Stock Exchange including Pronova, PhotoCure, Clavis, Biotec Pharmacon, DiaGenic, Nordiag and most recently PCI Biotech.

the potential to treat bone metastases that result from a range of cancers and we are also looking at developing Alpharadin for metastatic breast cancer.

For other suitable alpha emitters, such as Thorium-227, we have been developing 'linker' technologies for their attachment to cancer-targeting molecules, such as monoclonal antibodies. Last year, we published results of a study in Blood demonstrating the potent and specific anti-tumor effects of Thorium-227 linked to the monoclonal antibody rituximab, which is used to treat certain types of non-Hodgkin's lymphoma and rheumatoid arthritis.

In addition, we are developing delivery technologies for targeting alpha emitters to disseminated tumors in body cavities and in soft tissues. We are very excited about the possibilities that these platforms will offer.

### SO, WHAT 'S NEXT FOR ALGETA ?

The coming year is looking to be very exciting for Algeta, particularly as we focus on enrolment for our pivotal phase III trial with Alpharadin and further results from other ongoing clinical studies. In parallel, we continue to talk to potential partners about the further development and commercialization of this and our other innovative products and technologies.

Dr. Thomas Ramdahl, President & CEO, Algeta

Read more at [www.algeta.no](http://www.algeta.no)





Photo: Linda Cartridge/FUGE

FUGE is providing the funding and support for functional genomics platform for use by both research and industry in Norway.

## FIVE COMPANY GRANTS

# FROM FUGE

**FUGE, the Norwegian Research Councils program for functional genomics, recently granted funding to five life science companies: Ewos Innovation AS , siRNAsense AS , Spermatech AS , GenderGuide and PubGen.**

Ewos Innovation AS received grants for the project *“Developing the next generation of oral vaccines for salmonids using plastids in plants”*, siRNAsense AS for *“Tissue Factor siRNA for treatment of melanoma metastasis”*, Spermatech AS for *“Development of a male contraceptive - from hit to drug candidate”*, GenderGuide AS for *“Identification of boar semen gender specific proteins and peptides”* and PubGene AS for *“A bioinformatics platform for the pharmacogenomic analysis of sequence variation in complex diseases”*.



Photo: Jo Michel, Copyright Bioteknologisenteret

Professor Kjetil Taskén is one of the key supporters of Norway's growing life sciences sector.

## NORWEGIAN PARTICIPATION IN EATRIS

EATRIS is an acronym for European Advanced Translational Research Infrastructure. The Centre for Molecular Medicine Norway, the Nordic EMBL Partnership from the University of Oslo, is one of the participants in this EU-project, with the Research Council of Norway as an associated partner. The aim of the EATRIS is to come up with a good strategy for translational research in Europe, making sure that the research in medicine is translated into clinical practise, in the most effective way. This means making plans for the necessary investments in translational infrastructure and maintenance in the years to come. *“Participation in EATRIS is strategically important for Norway. We will try and position Norway in a way that we can host one of the EATRIS-centres that will be established later on,”* says professor Kjetil Taskén, Director of the Biotechnology Centre of Oslo at the University of Oslo.

Read more on EATRIS at [www.eatris.eu](http://www.eatris.eu)

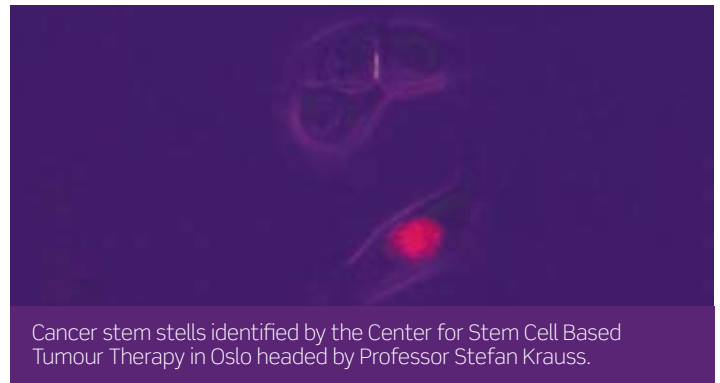


Photo: The Norwegian Cancer Stem Cell Innovation Center (CAST)

Cancer stem cells identified by the Center for Stem Cell Based Tumour Therapy in Oslo headed by Professor Stefan Krauss.

## MAJOR SHARE OF BIA GRANTS TO LIFE SCIENCE

The Program for User -driven Research-based Arena in the Norwegian Research Council (BIA) funds industry-oriented high-quality R&D projects to the tune of NOK300 million and has no thematic restrictions. In March BIA granted 47 projects funding, 14 of these within life sciences, approximately 30 percent of the overall grants. The following companies were granted funding: AlgiPharma AS (2 projects), Gentian AS, PhotoCure ASA, Bionor Immuno AS, Orthogenics AS, Alertis Medical AS, Axis Shield PoC AS, Biosergen AS, Regenics AS, Vaccibody AS, IC Particles AS, NorChip AS and AlphaPharma AS.

Read more at: [www.rcn.no/bia](http://www.rcn.no/bia)

# BIOPROSPECTING –

UNCOVERING NORWAY'S HIDDEN TREASURE

**The marine environment is a rich, yet largely unexplored, resource which could yield many novel bioactives. While the United States is at the forefront of marine bioprospecting, Norway could also achieve a global position because of its long tradition of harvesting the sea and the rich biodiversity of its Arctic and subArctic water.**

Norway's 'blue biotech' sectors is centered around the Northern city of Tromsø which is home to companies such as Biotec Pharmacon,

which develops applications for cold-adapted enzymes, and many others specializing in marine products. The sector has been given a big boost by the formation of the MabCent consortium, which is one of the Norwegian Research Council's 14 Centers for Research-based Innovation. MabCent is a five year initiative bringing together five technology platforms: MarBank, the National Marine Biobank, MarBio, a high throughput screening program, NorStruct (The Norwegian Structural Biology Center) and SmallStruct, which do structure determination on proteins and small molecules

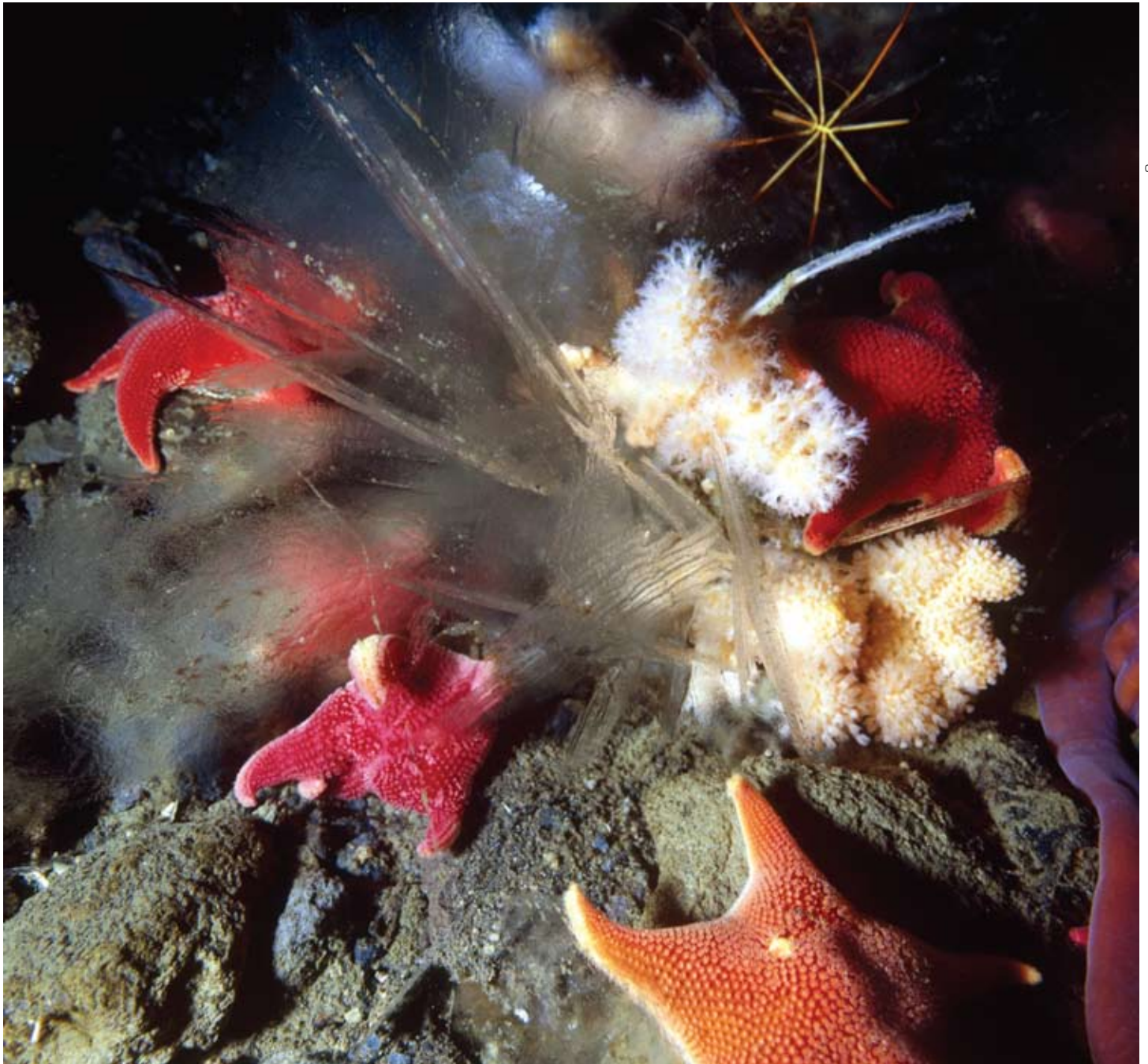


Photo: UMPphoto.no/Erling Svensen

MabCent aims to scope the pharmaceutical potential of marine flora and fauna from the Arctic and subArctic waters off the Norwegian coast.



Tromsø and Trondheim are key centres in marine bioprospecting with world leading research institutes.

respectively, and FUGE, the national functional genomics project. MabCent's discovery area lies off the coast of Northern Norway, up to the north of Svalbard – a unique environment where the warm waters of the Gulf Stream meet the cold waters coming from the Arctic. Here is a rich hunting ground for marine species such as bacteria, crustaceans, molluscs, annelids and sponges producing novel biomolecules that may have potential as anti-infectives and anti-tumor drugs. MabCent's work consists of screening, isolation and identification, molecular structure and mode of action studies on many thousands of marine extracts.

Meanwhile, researchers at the Norwegian University of Science and Technology (NTNU, Trondheim) and SINTEF (Foundation for Scientific and Industrial Research at the Norwegian institute of Technology) are investigating the rich ecological niches of the deep sediment and surface microlayer of the Trondheim fjord for bacteria that produce novel antibiotics, carotenoids and other dyes, and fatty acids. The team of Trond Ellingsen, Research Director at SINTEF, has studied over 30,000 extracts, many of which have antibacterial, anti-fungal, and anti-cancer activity.

Sergey Zotchev, Professor at the Department of Biotechnology at NTNU, leads the part of the program dealing with antibiotic discovery and focuses on collecting actinomycetes. *"Our studies of molecular taxonomy on these have revealed the diversity of bacteria from the fjord is huge,"* he commented. *"This is unexpected in a cold climate and we have a good chance of finding some novel compounds,"* Collection of actinomycetes isolated from the Trondheim Fjord consists of around 12,500 strains, many of them representing rare and new species. Especially interesting are actinobacteria isolated from the marine sponges, which have been screened for production of compounds with antimicrobial and antitumor activities. Currently, Zotchev's group, in cooperation with SINTEF and University of Bergen, is focusing on several extracts and already purified compounds showing high selective activity against multi-resistant bacteria and tumor cell lines. Zotchev is also Chief Scientific Officer

of Biosergen AS, a biotech start-up which is using genetic engineering combined with chemical synthesis to obtain novel analogues of anti-microbial and anti-tumor antibiotics with improved properties. The link between the bioprospecting project and Biosergen AS has already been established, as the company will start a new project based on anti-tumor antibiotic found in the Trondheim Fjord later this year. Bioprospecting also has a great deal to offer the oil industry. Hans Kristian Kotlar, Project Manager, Applied Biotechnology, at StatoilHydro says. *"We have found many new organisms in our oil reserves."* His team has been building a 16S RNA gene library of these and has found both bacteria and archaea. *"We found more bacteria than we expected,"* he comments. *"We were expecting to see more archaea."* The bacteria in oil reserves include many extremophiles which are resistant to high temperature, high pressure and high salinity, and have great potential as a source of new biocatalysts for use in both the oil industry and elsewhere.



Bioprospecting below the ice reveals a world of extremely "hardy" bioactive organisms!

These extremophiles use oil as a carbon source and Statoil is constructing DNA probes which can detect their presence, thereby allowing exploration for new reserves to take place in a less invasive way – particularly in sensitive environments where conventional drilling is not acceptable. Currently the company is seeking to validate this new approach. They also want to use the extremophiles to make more of existing reserves by, for example, decreasing their viscosity or otherwise improving their properties. *"If we can produce even a few percent more from a heavy oil, the benefits for us could be enormous,"* says Kotlar. *"This could be very important in the future."*

For information about Bioprospect 2009 in Tromsø, [www.bioprospect.no](http://www.bioprospect.no)

# CONSORTIUM FOR MAN-MADE MEAT

CREATES MINI RESEARCH COUNCIL

*In a decade you may be able to buy hamburgers in the shop, made from a bioreactor and not from a cow. – A novel approach to a problem which will not solve itself, says initiator professor Stig Omholt.*

The In Vitro Meat Consortium was formally established a year ago, but their first ever symposium was held in April at the Norwegian University of Life Sciences. Over 60 scientists and interested parties including New Harvest, an US organisation that funds R&D of in vitro meat projects, and others from all over the world sat down for three days, cooking their grandiose plans for coming up with the best recipe for making meat in the laboratory. Their goal is to satisfy the World's hunger for proteins while at the same time saving the climate and rescuing humans from animal transferable diseases – and last, but not least save chickens, pigs and cattle from horrors of industrial production. While it sounds astonishing, this may be feasible within a decade, depending on the funding, says the initiator of both the Symposium and Consortium, Professor Stig Omholt at the Norwegian University of Life Sciences.

## MAKING THE HEADLINES

It is not every day that a Norwegian makes the headlines of Times, The Times, Le Monde and New York Times, but Professor Omholt has, for his work on organizing a focused international effort on in vitro meat R&D. He however takes no credit for the idea of making meat without using an animal. Winston Churchill wrote about this possibility already in 1932, probably inspired by the writings of JBS Haldane in the 1920's. But the technology has not been available before now, which might be the perfect timing: a green wind is blowing with Al Gore winning the Nobel Peace Prize for his work on climate change while frequent headlines portrays starvation among the poorest people in the world due to rapidly increasing food prices. Also, with India and China taking gigantic leaps into development, the demand for meat will increase exponentially. By 2050 it will be double that of 2000, according to the UN. And that is only the environmental aspect; animal welfare is a whole other dish. People for the Ethical Treatment of Animals (PETA) is the world's largest animal rights organization, probably best known for its use of naked supermodels campaigning "I'd Rather Go Naked than Wear Fur". However in April 2008, PETA announced a US\$1m prize for the creation of a method to produce "commercially viable quantities of in vitro meat at competitive prices by 2012.

## MINCED MEAT

The aim of the Consortium is firstly to come up with a way to make minced meat for the use in hamburgers and sausages. To make a real steak with nice chewy texture is much more difficult, because then the scientists need to mimic actual vascularisation. But, scientists have already made meat in their Petri dishes in the lab, and it has been edible, so the basic technology and knowledge is there. It



World experts gathered recently in Oslo to get their teeth into the tasty issue of man-made meat!

Photo: Kjell Merok, Norfina Food

- Robert Dennis from the University of North Carolina calculates that with current lab scale instrumentation a 250 grams piece of meat would cost approximately one million dollars, says Omholt. The Consortium will address the challenges with lowering the production cost, finding the medium that will make their lab meat "grow" best, and then remains the challenge with finding what kind of source one should use for the actual meat. Currently the scientists are working with three different sources: stem cells, satellite cells and mesenchymal cells.

- A lot of money and work is currently going into stem cells biology research, but we have no strands of stem cells from pig, cattle or chicken, says Omholt.

When all these challenges are solved, the Consortium needs to build a bioreactor, the factory that will actually produce the meat, but then the industry is welcome to take over. A long way to go, in other words, but as Omholt says, the progress is only depending on the funding; the interest, basic knowledge and technology is already there.

## MINI RESEARCH COUNCIL

At the Symposium in April the scientists and other stakeholders made plans for the years to come.

- We are now setting up the In Vitro meat Consortium as a legal body that will function as a small international research council. The idea then is to get funding for all the R&D work that has to be done in order to find a feasible method for making meat on a large scale in a bioreactor. The legal structure ensures that we can act as fundraiser for the cause, and we will work actively to get donations from all over the world, says Omholt.

The funding money will then be distributed to research groups according to calls, like an ordinary research council does it.

Omholt will surely hit the headlines internationally again. He knows the idea and approach is unusual and risky, but as all great visionaries, he and his colleagues within the consortium are certain that it will work out in the end.

- We must think unconventional if we are to solve the problems the World is facing. I see man-made meat as an elegant way of using biotechnology in a way that really makes a difference, says Omholt.

For more information see the homepage for The In Vitro Meat Consortium: [www.invitromeat.org](http://www.invitromeat.org)

## SONITOR'S NEW PATIENT TAG

**PROFILED ON US TV**

Sonitor's Real Time Location System (RTLS) ultrasound technology for tracking patients and equipment has already been implemented in 24 US hospitals. Recently abc7 News ran a report showing how Tagnos' patient tracking software is used with Sonitor Technologies' Patient Tag to track how fast patients get through their medical visits at White Memorial Medical Center in East LA. "The beauty of this, is we know exactly where the patient is at every stage of the journey," said Dr. Randy Sadd, head of preoperative services at White Memorial.

Read more at [www.sonitor.com](http://www.sonitor.com)



Sonitor ultrasound tags allow tracking of patients and equipment throughout hospitals.

## BIOMEDICAL WIRELESS SENSOR NETWORK

**PHASE II APPROVED**

Having successfully demonstrated wireless monitoring of vital body signs during surgery in phase 1, BWSN-II will add new sensors designed to follow the patient into the intensive care monitoring, post-operative recovery and then even in the home. The Nordic Innovation Centre has approved the 2nd phase of the project, starting during the summer 2008 running for 18 months. BWSN-II will also include SINTEF (Norway) and Delta (Denmark) as new partners. The overall goal of the project is to achieve a biomedical wireless sensor network supporting monitoring related to different diseases, patient profiles and treatment life cycle included home care.

Read more at: [www.wirelesshealthcare.org](http://www.wirelesshealthcare.org)

**pHealth 2009 TO OSLO!**

The International Workshop on Wearable Micro and Nanosystems for Personalised Health, pHealth, will be held in Oslo in summer 2009. At least 300 attendees are expected to attend the conference and workshop, focusing on technology development and implementation of biomedical sensors for medical applications. Key topics at next years conference include advanced research in micro and nano sensors, wearable and implantable systems, technological trends in ICT solutions for patient self management, health and life management and personalised interactions, business visions and experiences and implementation viability.

For more information visit [www.phealth2008.com](http://www.phealth2008.com)

Photo: StockPhoto



# OSLO -

THE PERFECT ENVIRONMENT TO LIVE AND WORK

**The fjord, the woods and the culture make Oslo an exciting capital to live in. A blossoming biotech scene adds to the attraction for life scientists.**

Small for a capital, with only 500.000 inhabitants, Oslo is often compared unfavourably to other Scandinavian capitals such as Copenhagen and Stockholm. However a major facelift is currently taking place bringing the city and the fjord closer together again, with the new Oslo Opera House as a beautiful white flagship. In the years to come a whole new city district called Bjørvika will be developed around the Opera, forcing road traffic underground.

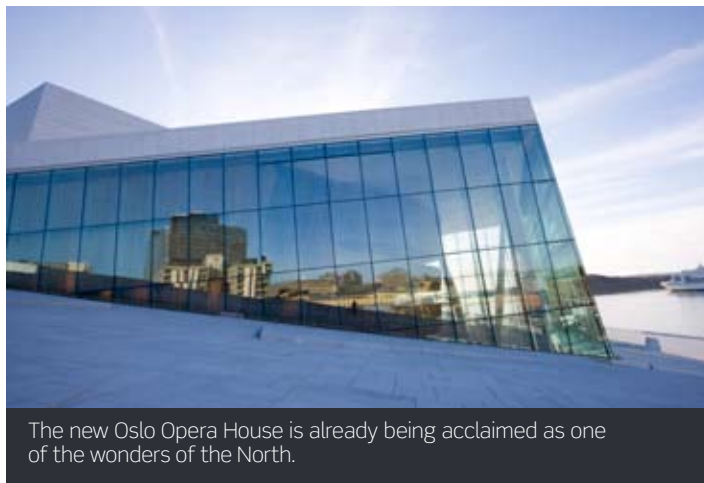
On the other side of the Oslo-fjord, close to Aker Brygge, the Astrup Fearnly Museum of Modern Art will be relocated to a spectacular new building designed by the famous Italian architect Renzo Piano, already renowned for buildings such as the Whitney Museum of American Art in New York and the Nemo science Museum in Amsterdam.

## BACK TO NATURE

Culture is one thing; but the closeness to nature is what really makes Oslo special - both the fjords and the forests are only a short tram or bus ride away from most places in the city. In winter skiing, cross country and alpine, are literally on your doorstep, and in summer the same woods are perfect for hiking and wildlife watching, elk being the most common animal to bump into. In the woods you can find plenty of places to camp and fish, and there are also many cabins open where you can get a Norwegian waffle and a hot chocolate or toddy to refill on.



Both the fjords and the forests are only a short tram or bus ride away from most places in the city of Oslo.



The new Oslo Opera House is already being acclaimed as one of the wonders of the North.

Photo: Trond Isaksen, Statsbygg

## EXCELLENT QUALITY OF LIFE

The quality of life in Norway is good, and people working there report a good work-life balance. Time off for family, friends and sports activities is valued highly among Norwegians, and the occasional "hyttetur", meaning a weekend or holiday trip to the family cabin in either the mountains or by the coast, is a prerequisite for most Norwegians living in cities. Norway has the second highest gross domestic product (GDP) in the world, according to International Monetary Fund (IMF) figures in 2007, and ranks second in the 2007 Human Development Index. Even though Oslo often scores high in statistics portraying it as a high cost city, the salaries are also high, and housing prices are not at all as bad as, for example, in London.

## BLOSSOMING LIFE SCIENCE SCENE

"Oslo has one of Europe's most attractive biotech clusters, including university hospitals such as Rikshospitalet-Radiumhospitalet and Ullevaal," says Martin Welshof, CEO, Affitech. Welshof is originally from Germany, but relocated to Oslo several years ago with his family. When he is not working, Welshof is often seen skiing in the woods surrounding Oslo.

Another Oslo fan is Bernt Olav Røttingsnes, CFO of Navamedics: "In Oslo you have access to top international competence in critical disciplines. This means access to both permanent employees and the necessary consultants. Proximity to investors and the Oslo Stock Exchange means easier access to capital, and makes follow-up of investors easier."

## STAFFING IN LIFE SCIENCE

"The Oslo region is the largest life sciences region in Norway", explains Susanne Werner, Project Manager, Oslo Teknopol. Oslo Teknopol is currently in collaboration with the Proffice Life Science, a staffing company focused on recruitment in the fields of pharmaceuticals, medicine and biotechnology, chemistry and chemical engineering and the food industry. "At Biotech Forum in Stockholm 2007 Proffice had representatives from both Oslo, Norway and Göteborg, Sweden working together with the regional organisations in the MedCoast Pavilion. The result was very positive and Proffice has now established a highly professional Nordic life science team serving the Nordic market," reports Werner.

Read more at [www.oslo.teknopol.no](http://www.oslo.teknopol.no) or [www.visitoslo.com](http://www.visitoslo.com)

# EVENT CALENDAR

Meet representatives from the Oslo life science sector at:

## JUNE

17 - 20 Scandinavia Pavilion at BIO 2008, San Diego, USA,  
[www.bio2008.org](http://www.bio2008.org)

## JULY

21 - 1 International Carbohydrate Symposium in Oslo, Norway,  
[www.ics2008.uio.no](http://www.ics2008.uio.no)

## SEPTEMBER

12 Birkeland Innovation Day in Oslo, Norway,  
[www.birkelandinnovasjon.no](http://www.birkelandinnovasjon.no)

15-19 Oslo Bio delegation at HospiMedica, Singapore,  
[www.hospimedica-asia.com](http://www.hospimedica-asia.com)

23- 25 MedCoast Scandinavia Pavilion at Biotech Forum 2008  
in Copenhagen, Denmark,  
[www.biotechforum.org](http://www.biotechforum.org)  
[www.nanotech.net](http://www.nanotech.net)  
[www.scanlab.nu](http://www.scanlab.nu)

## OCTOBER

13 -17 Oslo Innovation Week in Oslo, Norway,  
[www.oiw.no](http://www.oiw.no)

15 Oslo Cancer Cluster Forum 2008 in Oslo, Norway,  
[www.oslocancercluster.org](http://www.oslocancercluster.org)

20 - 22 Oslo Cancer Cluster at TRISC 2008, Washington, USA,  
[www.oslocancercluster.org](http://www.oslocancercluster.org)

## NOVEMBER

19-22 Oslo MedTech at MEDICA 2008 in Düsseldorf, Germany,  
[www.medica.de](http://www.medica.de)

## DECEMBER

9-10 Oslo Cancer Cluster at Genesis Bio Conference, London,  
UK, [www.genesisconference.com](http://www.genesisconference.com)

## FEBRUARY 2009

24-25 Bioprospect 2009, Tromsø, Norway,  
[www.bioprospect.no](http://www.bioprospect.no)



Photo: Innovasjon Norge/Nancy Bunde



Photo: Innovasjon Norge/Nancy Bunde

# siRNAsense AS

siRNAsense uses novel techniques within the field of RNA interference to develop new drugs to combat cancer.

## COMPANY FOCUS:

siRNAsense AS was founded in December 2004 based on RNA interference research performed at The Biotechnology Centre of Oslo (BIO). The discovery of RNA interference is the basis for development of a new class of drugs targeting serious diseases. Their first candidate "siRNA targeting Tissue Factor" is a synthetically made siRNA that knocks out the cancer cells ability to attach to other cell membranes. This stops metastasis of the cancer cells. Over 90 percent of cancer death in humans is caused by metastasis. The company is in pre-clinical trials with the drug on melanoma metastasis.

## MANAGEMENT

Hanne Mette D. Kristensen, CEO  
Mohammed Amarzguioui, Research Director

## COLLABORATIONS

siRNAsense's drug candidate siRNA targeting Tissue Factor is based on many years of research by the group of dr. Hans Prydz at the Biotechnology Centre of Oslo. BIO and siRNAsense still has ongoing and close collaboration. Academic collaborators include Dr. Joanne Bluff and professor Nicola Brown, University of Sheffield.

## KEY PATENTS

The TF project is supported by patent applications claiming firstly composition of compounds and secondly area of application. A favorable statement to patentability has been received. siRNAsense owns the rights to these patents.

## RECENT PUBLICATIONS

Amarzguioui M et al. Rational design and in vitro and in vivo delivery of Dicer substrate siRNAs. Nature Protocols 2006. 2:508-517.  
Amarzguioui M. RNAi-based therapeutics - promises and challenges. Innovations in Pharmaceutical Technology 2006. April edition (p 30-35).

## INVESTORS

Bio-Medisinsk Innovasjon AS owns 51 percent of the company, and other investors include Dag Dvergsten AS and Springfondet. siRNAsense has received financial support from the Research Council of Norway and from the Norwegian Cancer Society. The company is in the portfolio of Bio-Medisinsk Innovasjon AS, which is an incubator for biomedical start-up companies in the Oslo region.

Read more at [www.sirnasense.com](http://www.sirnasense.com)

## Oslo Teknopol

- your key to the Oslo region

Oslo Teknopol aims to stimulate innovation and attract foreign investments and talent to Norway's capital region. We offer free assistance and information about business conditions and opportunities within life sciences and other key knowledge-based clusters in the Oslo region:

- Maritime
- Energy and environmental technology
- Information and communication technology
- Life science
- Culture

Oslo Teknopol is a non-profit regional development agency, established by the City of Oslo and Akershus County Council.



Oslo Bio is a collaborative network of stakeholders from the life science cluster. Oslo Bio aims to strengthen the cluster and contribute to long term growth through marketing, initiating and facilitating development projects, and international collaboration. Oslo Teknopol act as the secretariat for Oslo Bio.

For more information or to subscribe to Oslo Bio Update contact Oslo Teknopol at [info@oslo.teknopol.no](mailto:info@oslo.teknopol.no)

