

Biotech SMART Reports

Summarized Multipurpose Articles on Research and Technology
[SMART]

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Agriculture Biotechnology
Medical Biotechnology (Healthcare)
Microbial Biotechnology
Nano Biotechnology
Pharmaceutical Biotechnology



BIOTECHNOLOGY INDUSTRY RESEARCH ASSISTANCE PROGRAM

A program of
Department of Biotechnology, Ministry of Science and Technology, Government of India
In partnership with ABLE and BCIL

Biotech SMART Report

(Summarized Multipurpose
Articles on Research and
Technology)

Biotech SMART Report is a Quarterly publication from BIRAP, a programme of DBT, Govt. of India which is dedicated to nurture, incubate and discover innovative research in the Biotechnology Industry.

The Report is an assemblage of updated news reports from company websites, e-newspapers, e-magazines and market report updates in the area of Biotechnology.



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Published by:

BIRAP

A – 254, 3rd & 4th Floor, Bhasham Pitamah Marg,
Defence Colony New Delhi – 110024 I N D I A

Tel: +91-11-47744500 – 510 | Fax: +91-11-47744511

Email : birap.dbt@nic.in | Web : www.birapdbt.nic.in

Compiled By:

Suryakant Pathak

(Information & Documentation Officer)

Tel: +91-11-47744500 – 510 | Fax: +91-11-47744511

Direct Line: 011-47744522 | Cell: +91 9555 469 237

V. Con: +91-11-47744599

Email : spathak.birap@nic.in | Web : www.birapdbt.nic.in

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Headline: - New Cancer Research Priorities Recommended By Expert

Published by: - Medical News

Date of Publication: - September 23, 2009

Source: - <http://www.medicalnewstoday.com/printerfriendlynews.php>

Cancer research is too focused on new drug development, while not enough money and effort is being devoted to pursuing important advances in knowledge likely to have the biggest impact on combating the disease in the next few decades, a leading research policy expert says, adding that a major shift in research priorities will be crucial to the ability to cope with the coming wave of cancer cases.

Professor Richard Sullivan of the King's Health Partners Integrated Cancer Centre in London told Europe's largest cancer congress, ECCO 15 - ESMO 34 [1], in Berlin on 22 September that studies aiming to improve surgery, pathology and diagnostic and staging imaging, as well as a radical rethink of the approach to prevention research, must become the focus of public- and federally-funded cancer research now. The global public sector spend on cancer research was about €14 billion a year in 2004/05, the latest year for which figures are available. Non-commercial funders in Europe spent just over €3 billion on cancer research in 2004/05.

"An analysis we have just completed shows that, on average, European public funders are spending 74% of their money on fundamental biology and drug development research and that well over 70% of the cancer research initiatives at the European level are aimed at the same areas," said Prof Sullivan, who is also chairman of the European Cancer Research Managers Forum, which studies cancer research and funding in Europe. "In the United States, the imbalance is even greater. There is no shortage of cancer drugs coming through pipeline and the whole area of drug research is quite healthy. What we need is a reapportioning of budgets from the charitable sector and public funders to carve out space for these other areas of cancer research that are largely invisible to a lot of policymakers.

"This is a deeply unfashionable view and the easy way out is to say that we must just ask for more money, but the reality is that we've got to prioritise," Prof Sullivan said. "Most of the new medicines are having a small impact on the big picture of cancer burden at the moment, extending life by a few months. Research in this area is already heavily funded and that will continue regardless, as will the investments in fundamental cancer biology."

The World Health Organization predicts that the number of people worldwide living with cancer will rise from about 28 million today to about 75 million in 2030. Detecting cancer early enough to treat it successfully and improving our understanding of how to make primary prevention strategies work hold the potential for the greatest gains, he said.

"This demands an overhaul of prevention research. You can take the quite reasonable view that we know the risk factors now. What we don't understand is how to take that research on prevention and apply it in populations because we don't understand the behaviour of those groups or how that might change over the next 20 or 30 years. For instance, how do we address the fact that many men across Europe will put up with rectal bleeding for a year before going to see a doctor? This is very important because cancer is not just about genes, it is predominantly about culture."

Cancer researchers must now be more imaginative and collaborate across unusual disciplinary boundaries to embrace behavioural engineering, population psychology, evolutionary biology, novel sociological methods and ideas such as cultural transmission theory - the study of how behaviours are learned and transmitted between generations, said Prof Sullivan.

"Research in these novel areas addresses questions that can never be answered with classical epidemiological studies or standard social science questionnaires - we've reached the limits of enquiry with many standard approaches. There are people doing fantastic work that could be extremely useful not only to cancer research, but to medicine in general and most medics and researchers are completely ignorant about their existence and what they can do for medicine. It is a huge untapped area with massive potential to make a difference," Prof Sullivan said.

The growing scale of cancer in developing countries also presents an imminent challenge for cancer research, he said. More than half of all cancer diagnoses occur in developing countries, which will bear a large majority of the global burden before long. Keeping the research focus as it is in developed countries will not address the problem in the developing and transitional countries because drug development is not going to be the answer. Surgery and radiotherapy are the most important approaches for reducing the global cancer burden and financial support for programmes that bring those treatments to developing countries is still very poor.

"The argument is always made that there is enough to deal with in developing countries with the infectious disease challenges, but chronic disease is a major, often unrecognised problem and we can't afford to wait any longer. Like it or not, developed countries have a responsibility to investigate which cancer control approaches are exportable and to support those institutions working in these areas," he said.

Governments, research charities and European funders need to recognise the importance of shifting the focus to a new approach to prevention research and more investment in non-drug treatment research, but it will be largely up to cancer researchers to drive the change, Prof Sullivan said.

"There has already recently been a major shift in Europe toward hospital-university alliances driving the agenda. They need to start banging on the doors of the non-government organisations and the federal funders, lobbying hard and proving that it's important to give attention to these neglected areas of cancer research."

Headline: - PROLOR Biotech Announces Initiation of Phase I Clinical Trial for Its Long-Acting Growth Hormone

Published by: - Medical News

Date of Publication: - September 22, 2009

Source: - <http://www.medicalnewstoday.com>

PROLOR Biotech, Inc. (OTC Bulletin Board: PBTH) formerly Modigene Inc., announced the initiation of a Phase I clinical trial of its long-acting human growth hormone drug candidate hGH-CTP.

hGH-CTP is being developed to provide growth hormone deficient adults and children with the option to replace the multiple injections per week that are currently required with a once-weekly or bi-monthly injection. The initiation of the trial follows a successful safety and immunogenicity study of hGH-CTP in primates and regulatory approvals by the IRB committee of the Tel-Aviv Medical Center and the Israeli Ministry of Health.

The Phase I trial is a randomized, double-blinded, placebo-controlled, single-dose, dose-escalating study to evaluate the safety, tolerability, and pharmacokinetic and pharmacodynamic properties of hGH-CTP in 24 healthy volunteers. It will be conducted at the Early-Phase Clinical Pharmacology Unit located at the Tel-Aviv Medical Center.

"The initiation of a Phase I clinical trial of our long-acting hGH-CTP represents an important milestone for PROLOR," said Dr. Avri Havron, CEO of PROLOR. "We were delighted with the results of our hGH-CTP studies in primates, which showed that hGH-CTP had an excellent half-life and biological activity and was safe at all doses tested without any signs of immunogenicity. We are now eager to obtain data on its bioactivity in humans."

Dr. Havron continued, "This trial is being conducted at the Early-Phase Clinical Pharmacology Unit at the Tel-Aviv Sourasky Medical Center, a top-notch facility that has a successful track record of conducting more than 250 clinical studies for leading global pharmaceutical and biotech companies in a variety of clinical areas. We look forward to completing the Phase I trial so that we can move ahead with the further clinical development of hGH-CTP."

ABOUT hGH-CTP

hGH-CTP is PROLOR's proprietary long-acting version of human growth hormone. hGH is used for the long-term treatment of children and adults with growth failure due to inadequate secretion of endogenous growth hormone. It is also sometimes used to counter involuntary weight loss and certain physical manifestations of aging. Patients currently using hGH must inject the drug between two and

seven times each week. In contrast, hGH-CTP is expected to require only weekly or bi-monthly injections. In 2007 the annual market for hGH was estimated at \$2.5 billion.

ABOUT CTP

PROLOR's CTP technology is based on an amino acid sequence that occurs naturally in humans, the carboxyl terminal peptide. When attached to a therapeutic protein, CTP extends the time that the protein is active in the body. The potential utility of the technology has been demonstrated by Schering-Plough, which in 2009 announced successful data from its Phase III ENGAGE trial demonstrating that women receiving a single injection of the fertility drug FSH-CTP achieved the same pregnancy rates as women receiving seven consecutive daily injections of commercial FSH. This 1,509 patient trial formed the basis for a Marketing Authorization Application by Schering-Plough that is currently under review by the European Medicines Agency. PROLOR is using the same CTP technology to extend the duration of action of human growth hormone and other therapeutic proteins. It has an exclusive license from Washington University in St. Louis to the CTP technology for use with all therapeutic proteins except for the four fertility hormones licensed to Schering-Plough.

ABOUT PROLOR BIOTECH

PROLOR Biotech, Inc. is a biopharmaceutical company applying unique technologies, including its patented CTP technology, primarily to develop longer-acting, proprietary versions of already approved therapeutic proteins that currently generate billions of dollars in annual global sales. The CTP technology is applicable to virtually all proteins and PROLOR is currently developing long-acting versions of human growth hormone, which recently entered Phase I clinical trials, and interferon beta and erythropoietin, which are in late preclinical development, as well as GLP-1.

Safe Harbor Statement: This press release contains forward-looking statements, including statements regarding the results of current clinical studies and preclinical experiments and the effectiveness of PROLOR's long-acting protein programs, which are made pursuant to the safe harbor provisions of the Private Securities Litigation Reform Act of 1995. Investors are cautioned that forward-looking statements involve risks and uncertainties that may affect PROLOR's business and prospects, including the risks that PROLOR may not succeed in developing any commercial products, including any long-acting versions of human growth hormone, erythropoietin, interferon beta, GLP-1, and other products; that the long-acting products in development may fail, may not achieve the expected results or effectiveness and/or may not generate data that would support the approval or marketing of these products for the indications being studied or for other indications; that ongoing studies may not continue to show substantial or any activity; that the actual dollar amount of any grants from the OCS is uncertain and is subject to policy changes of the Israeli government, and that such grants may be insufficient to assist with product development; and other risks and uncertainties that may cause results to differ materially from those set forth in the forward-looking statements. The development of any

products using the CTP platform technology could also be affected by a number of other factors, including unexpected safety, efficacy or manufacturing issues, additional time requirements for data analyses and decision making, the impact of pharmaceutical industry regulation, the impact of competitive products and pricing and the impact of patents and other proprietary rights held by competitors and other third parties. In addition to the risk factors described above, investors should consider the economic, competitive, governmental, technological and other factors discussed in PROLOR's filings with the Securities and Exchange Commission.

Headline: - New blood tests 'to detect gastrointestinal cancers'

Published by: - Deccan Chronicle

Date of Publication: - September 21, 2009

Source: - <http://www.deccanchronicle.com/>

Scientists have developed two new blood tests which they claim will make detection of gastrointestinal cancers simpler, cost-effective and more acceptable to patients than the existing methods.

In the first research, a team led by Joost Louwagie of Belgium-based OncoMethylome Sciences collected blood samples before surgery from 193 patients having colorectal cancer, and from 688 controls undergoing colonoscopy for cancer screening.

DNA was extracted from the blood plasma and tested for the presence of DNA methylation - that's linked to initiation and progression of tumours - of specific genes.

The scientists then evaluated the best-performing methylated genes in blood samples, with the ultimate goal of providing a sensitive, specific and patient-friendly option for colorectal cancer screening.

"This test has potential to provide a better balance of performance, cost-effectiveness and patient compliance than options currently available for colorectal cancer screening.

"We optimised the methods of DNA extraction and methylation detection so that we could detect low levels of methylated genes in people with colorectal cancer, and we were able to find a high frequency of two newly methylation genes, SYNE1 and FOXE1, in colorectal cancer patients."The same methylation genes occurred infrequently in non-cancerous individuals," Louwagie said.

Headline: - Anticancer Nanotech: Protein Can Be Used To Carry Radioactive Isotopes to Cancerous Tumor

Published by: - Science Daily

Date of Publication: - September 21, 2009

Source: - <http://www.sciencedaily.com>

Tiny particles of albumin, a protein found in the blood, can be used to carry radioactive isotopes to the site of a cancerous tumour in the body and so avoid many of the side-effects of conventional radiotherapy.

Virginia Nazarica Borza, Elena Neacsu and Catalina Mihaela Barna of the "Horia Hulubei" National Institute of R&D for Physics and Nuclear Engineering, in Bucharest, Romania, report details of the preparation of human serum albumin nanospheres labelled with rhenium-188 radioisotope, in the current issue of the *International Journal of Nanotechnology and Biomaterials*.

Drug-delivery agents that can target the site of disease in the body have often been referred to "magic bullets". Previously, such systems have not lived up to their name. However, the advent of nanotechnology is bringing such agents a step closer. The delivery of drug directly to the site where it is needed and at the level that is required for treatment is essential if efficacy is to be improved and side effects minimised. Due to their particular chemical and physical properties, nanoparticles offer the possibility of developing such therapeutic or diagnostic agents.

Now, Borza and colleagues have found a way to load up nanospheres of water-soluble protein from blood plasma with the radioactive element rhenium-188. This radionuclide emits beta particles, high-energy electrons, as it decays radioactively, but is short-lived so causes no long-term problems. Such high-energy beta-emitter radioisotopes coupled to nanoparticles could deliver a high therapeutic dose of radioactivity to a tumour, while sparing more distant tissues from toxicity.

The team has determined the optimal safe parameters for making the cancer-killing nanospheres and tested their overall stability in the laboratory. They load up the albumin nanoparticles, a process known as radiolabelling, by heating the albumin nanospheres and rhenium-188, in the presence of a tin salt, stannous chloride and a claw-like chelating agent, tartrate, which can grab on to the rhenium-188.

The next step is to carry out pre-clinical studies on how well the radiolabelled nanospheres can target tumour cells and to demonstrate by how much therapeutic efficacy might be improved using these drug-delivery agents.

Headline: - New rabies vaccine may require only a single shot... not 6

Published by: - The Hindu

Date of Publication: - September 19, 2009

Source: - <http://beta.thehindu.com/sci-tech/science>

The current standard post-exposure regimen is not feasible in the developing world, where rabies is endemic.

A person, usually a child, dies of rabies every 20 minutes. However, only one inoculation may be all it takes for rabies vaccination, according to new research published in the *Journal of Infectious Diseases* by researchers at the Jefferson Vaccine Center, reports Eurekalert.

A replication-deficient rabies virus vaccine that lacks a key gene called the matrix (M) gene induced a rapid and efficient anti-rabies immune response in mice and non-human primates, according to James McGettigan, Ph.D., assistant professor of Microbiology and Immunology at Jefferson Medical College of Thomas Jefferson University.

"The M gene is one of the central genes of the rabies virus, and its absence inhibits the virus from completing its life cycle," Dr. McGettigan said. "The virus in the vaccine infects cells and induces an immune response, but the virus is deficient in spreading."

The immune response induced with this process is so substantial that only one inoculation may be sufficient enough, according to Dr. McGettigan. In addition, the vaccine appears to be efficient in both pre-exposure and post-exposure settings.

Currently, the World Health Organization standard for rabies infection is post-exposure prophylaxis. The complex regimen in the United States requires six different shots over 28 days: five of the rabies vaccine and one of rabies immunoglobulin.

Headline: - Rare Genetic Disease Successfully Reversed Using Stem Cell Transplantation

Published by: - Science Daily

Date of Publication: - September 18, 2009

Source: - <http://www.sciencedaily.com>

A recent study by Scripps Research Institute scientists offers good news for families of children afflicted with the rare genetic disorder, cystinosis. In research that holds out hope for one day developing a potential therapy to treat the fatal disorder, the study shows that the genetic defect in mice can be corrected with stem cell transplantation.

"After meeting the children who suffer from this disease, like an 18-year-old who has already had three kidney transplants, and the families who are desperately searching for help, our team is committed to moving toward a cure for cystinosis, a lysosomal storage disorder," says principal investigator Stephanie Cherqui, assistant professor in the Department of Molecular and Experimental Medicine. "This study is an important step toward that goal."

In the study, which is published in the September 17, 2009 print edition of the journal *Blood*, the Scripps Research team used bone marrow stem cell transplantation to address symptoms of cystinosis in a mouse model. The procedure virtually halted the cystine accumulation responsible for the disease and the cascade of cell death that follows.

Cystine is a byproduct of the break down of cellular components the body no longer needs in the cell's "housekeeping" organelles, called lysosomes. Normally, cystine is shunted out of cells, but in cystinosis a gene defect of the lysosomal cystine transporter causes it to build up, forming crystals that are especially damaging to the kidneys and eyes.

A Rare But Devastating Disease

While cystinosis is rare—affecting an estimated 500 people in the United States and 2,000 worldwide—it is devastating. Three types of cystinosis have been described based on the age at diagnosis and the amount of cystine in cells: infantile onset, adolescent onset, and adult onset. Children as young as six months can begin to suffer renal dysfunction, which grows progressively worse with time. Other symptoms include diabetes, muscular disease, neurological dysfunction, and retinopathy. Infantile onset is the most common, as well as the most severe, form of the disease.

The only available drug to treat cystinosis, cysteamine, while slowing the progression of kidney degradation, does not prevent it, and end-stage kidney failure is inevitable.

"Cysteamine must be given every six hours, so children have to be woken up each night to take this drug, which has unpleasant side effects, and many others to treat various symptoms," Cherqui says. "So although there is treatment, it is difficult treatment that does not cure the disease."

"Surprised and Encouraged"

In the new study, the researchers found that transplanted bone marrow stem cells carrying the normal lysosomal cystine transporter gene abundantly engrafted into every tissue of the experimental mice. This led to an average drop in cystine levels of about 80 percent in every organ. In addition to preventing kidney dysfunction, there was less deposition of cystine crystals in the cornea, less bone demineralization, and an improvement in motor function.

"The results really surprised and encouraged us," says Cherqui, who as a doctoral student in France in 1998 helped discover the gene involved in cystinosis. "Because the defect is present in every cell of the body, we did not expect a bone marrow stem cell transplant to be so widespread and effective."

Cherqui, who generated the mouse model in 2000 that is currently used to study cystinosis, says that adult bone marrow stem cell therapy is particularly well suited as a potential treatment for cystinosis because these cells target all types of tissues. In addition, stem cells reside in the bone marrow for the duration of a patient's life, becoming active as needed, a particular benefit for a progressive disease like cystinosis.

The work of Cherqui and her colleagues may have wider applications for other genetic diseases, providing proof of principle that adult stem cell transplants may be successful in humans for genetic diseases with systemic defects, especially those of a progressive nature.

Cherqui expects to spend the next several years analyzing the safety of genetically modified autologous (obtained from the same individual) bone marrow transplants in the cystinosis mouse and other models before moving on to human clinical trials.

In addition to Cherqui, authors of the study "Successful treatment of the murine model of cystinosis using bone marrow cell transplantation" include first author Kimberly Syres of Scripps Research; Frank Harrison, Matthew Tadlock, and Daniel R. Salomon of Scripps Research; James V. Jester and Jennifer Simpson of the University of California, Irvine; and Subhojit Roy of the University of California, San Diego.

This work was funded by the Cystinosis Research Foundation.

Headline: - India's TB treatment strategy stands vindicated

Published by: - The Hindu

Date of Publication: - September 17, 2009

Source: - <http://beta.thehindu.com/sci-tech/science>

A paper based on a study commissioned by the World Health Organisation (WHO), and published online in the Open Access journal PLoS Medicine, has clearly vindicated India's position on treating newly diagnosed TB patients.

"The paper clearly endorses the stand taken by RNTCP [Revised National Tuberculosis Control Programme]," said Dr. V. Kumaraswami, Director-in-Charge of Tuberculosis Research Centre, Chennai.

India has been facing much criticism for treating patients by using a different regimen, especially since it has a huge disease burden. China is only other country that follows the same regimen as India.

Not daily

India and China have opted for a thrice-a-week regimen during the six-month therapy period. Most developed countries have gone in for the daily regimen.

"There was little evidence of difference in failure or relapse with daily or intermittent schedules of treatment administration," is one of the main findings of the paper.

The study, which reviewed 57 randomised controlled trials involving 21,000 patients, was undertaken to provide WHO the much needed evidence for a revision of TB treatment guidelines.

Different regimen

The paper looks at newly diagnosed patients undergoing treatment for the first time. The four antibiotics used for treating such patients are rifampicin, isoniazid, ethambutol and pyrazinamide.

According to WHO's treatment guidelines, patients can be treated either by a six-month or an eight-month regimen.

In the case of the eight-month regimen, all four antibiotics are given for the first two months, and two drugs for the remaining six months. Rifampicin is not one of the drugs given during the remaining six months. This was the option given to resource-poor countries and where DOTS implementation was difficult.

In the case of the six-month regimen, all the four drugs are administered for the first two months, and rifampicin and another antibiotic for the remaining four months. The medicines can be given either daily or thrice a week (intermittent dosing schedule) during the entire course of the therapy.

India and China are the only two countries that have opted for thrice a week regimen during the six-month regimen. Most developed countries have gone in for the daily regimen.

There were two choices given by WHO for using rifampicin. Countries could either use it throughout the six-month therapy or go for the eight-month therapy where rifampicin is given daily only during the first two months and stopped thereafter.

The paper found that there was increased risk of poor treatment outcomes and drug resistance when rifampicin was not given throughout the six-month therapy period and when it was given only during the first two months in the case of the eight-month regimen.

To revisit guidelines

According to the paper, WHO had changed the treatment guidelines from six months to eight months for the 24-high-incidence countries for newly diagnosed untreated patients.

But the evidence from the study clearly indicates that such a change was not required. "WHO will [now] recommend only the six-month (rifampicin throughout) regimen, and the eight-month regimen will no longer be recommended," the paper states.

There are several reasons why India chose the thrice-a-week regimen. "It is convenient, reduces the cost by more than half, and adverse reactions are less when given intermittently," said Dr. Kumaraswami. "It also enables the implementation of DOTS."

Headline: - Breath analysers to diagnose lung cancer

Published by: - The Hindu

Date of Publication: - September 01, 2009

Source: - <http://beta.thehindu.com/health>

It is not just alcohol that can be detected using a breath analyser. Scientists from the Technion-Israel Institute of Technology in Haifa have found a way to diagnose lung cancer from a person's breath.

A paper published online in the journal *Nature Nanotechnology* shows how easy it is to diagnose lung cancer.

According to a news item in the journal *Nature*, the researchers led by Hossam Haick used gold nanoparticles coated with a thin layer of organic material to diagnose lung cancer.

Forty patients who had confirmed lung cancer and 56 healthy individuals were recruited for the trial. All the individuals were first asked to breathe deeply through a filter that purified the lungs. They were then asked to breathe into a bag. The air in the plastic bags served as samples.

The air from the bags was blown into the gold-silicon circuit. "The electrical resistance of the gold nanoparticles rose or fell depending on the presence or absence of certain compounds," notes *Nature*.

Many studies have shown that several volatile organic compounds that are present in human breath can be used to detect lung cancer. While these volatile compounds are present in lower concentrations (1-20 parts per billion (ppb)) in the breath of healthy people, it tends to be present in elevated levels (10 to 100 ppb) in those with lung cancer.

The gold-silicon sensors when used in an array were able to detect many volatile compounds. In combination with conventional methods like microextraction and gas chromatography/mass spectrometry, the team detected 42 compounds that were found at elevated levels in lung cancer patients. The team finally zeroed in on four compounds.

"Four of these [compounds] were used to train and optimize the sensors, demonstrating good agreement between patient and simulated breath samples," the authors note in their paper.

According to *Nature*, the gold circuits are much better than Dr. Haick's carbon nanotubes used for diagnosing lung cancer. The nanotubes have a major drawback — it is too sensitive to water vapour, a major component in human breath.

The team realised something very important after they finished their paper. "Haick's team discovered a bonus: With gold, patients don't have to avoid alcohol, coffee, tobacco, or food before tests, all of which had confounded previous devices," notes *Nature*.

The authors are confident that their sensors would be an inexpensive and non-invasive diagnostic tool to diagnose lung cancer. The sensors can also be reused

Headline: - Brainstorm Cell Therapeutics Secures Funding To Reach Clinical Trials for ALS

Published by: - Medical News

Date of Publication: - August 26, 2009

Source: - <http://www.medicalnewstoday.com/articles/161825.php>

BrainStorm Cell Therapeutics Inc. (OTCBB: BCLI), a leading developer of adult stem cell technologies and therapeutics, announced that the company has secured the funding required to complete pre-clinical trials underway for the treatment of ALS (Amyotrophic Lateral Sclerosis, also known as Lou Gehrig's disease). The company expects to begin Phase I clinical studies in 2010.

The new funding includes both a prestigious grant from the Israeli government's Office of the Chief Scientist (OCS) as well as private investment.

"We are very gratified to receive these financial votes of confidence in our breakthrough stem cell technology. The new funding will enable us to complete our pre-clinical studies in ALS and meet our goal of beginning clinical studies in the coming year," said Rami Efrati, CEO of BrainStorm.

The non-equity OCS grant amounts up to \$450,000 and marks the third consecutive year in which BrainStorm has been selected as a recipient. The company previously was awarded OCS grants totaling \$798,000. BrainStorm's royalty obligations to the OCS are capped at the amount of the grant received from the OCS.

In addition, ACCBT Corporation, a private company investing in biotechnology, has announced that it will implement an additional investment of about \$1 million in BrainStorm. ACCBT is under the control of Chaim Lebovits, BrainStorm's President, and has previously invested more than \$4 million in the company. The new funding will comprise monthly tranches of \$50,000 or more as of August 2009. In return for its investment, ACCBT will receive shares of common stock from the company at a price of \$0.12 per share and warrants for \$0.29. (Share price as of closing of August 21 is \$0.061)

"The promising study results we have seen so far make me confident that the company, with G-D's help, will be able to rapidly progress to a therapy for the unmet medical need of devastating neurodegenerative conditions like ALS," said Mr. Lebovits.

Headline: - Scientists create blood from human stem cells

Published by: - The Times of India

Date of Publication: - August 24, 2009

Source: - <http://timesofindia.indiatimes.com/>

WASHINGTON: Scientists have turned human stem cells into "glow in the dark" red blood cells, which they claim will soon help them to create mature, transfusable and life-saving blood.

An international team led by Monash University, has modified a human embryonic stem cell line to glow red when the stem cells become red blood cells, the latest edition of the 'Nature Methods' journal reported.

According to the scientists, they are now a step closer to making fully functional red blood cells from human embryonic stem cells. Whilst human embryonic stem cells (hESCs) have the potential to turn into any cell type in the body, it remains a scientific challenge to reliably turn these stem cells into specific cell types such as red blood cells.

According to the scientists, the development of the ErythRED embryonic stem cell line, which fluoresces red when haemoglobin genes are switched on, is an important development that will help optimise conditions which generate these cells.

Headline: - Protein-Based Drugs Could Be Improved By Novel Polymer

Published by: - Medical News

Date of Publication: - August 20, 2009

Source: - <http://www.medicalnewstoday.com/articles/161260.php>

A new method for attaching a large protective polymer molecule to a protein appears to improve protein drugs significantly.

Bioengineers at Duke University developed the new approach and demonstrated in an animal model that the newly created protein-polymer combinations, known as conjugates, remained in circulation significantly longer than an unprotected protein.

The scientists say they are encouraged that their findings represent a new strategy to improve the efficacy of protein drugs. Protein-based drugs are an increasingly important new class of drugs, said Ashutosh Chilkoti, Theo Pilkington Professor of Biomedical Engineering at Duke's Pratt School of Engineering. He cited such examples as insulin for the treatment of diabetes and more exotic "magic bullet" antibodies like herceptin that are used to treat certain cancers.

Unmodified proteins that are injected into the blood are quickly recognized by the body and broken down or cleared by the body's defense system, which limits their effectiveness as drugs. To get around this problem, drug makers have been attaching another molecule, a polymer known as polyethyleneglycol (PEG), to the protein in order to protect it. But this approach has its own drawbacks.

"The current method of combining the two molecules often only works with 10 to 20 percent efficiency, so that a lot of the very expensive starting materials are wasted," said Chilkoti, who had the results of his team's experiments published this week online in the Proceedings of the National Academy of Sciences. "Additionally, the two large molecules are attached by a small chemical link and often these linkages can occur at many different sites on the protein, so the final product is poorly defined."

Chilkoti took a different approach. Instead of combining two large molecules, he grew the polymer out from the protein itself, increasing the efficiency of the protein by more than 70 percent and greatly extending the amount of time it remained active in a living model.

"We also addressed the problem of getting a pure and well-defined product by growing the polymer from a single, unique site on the protein," he said. "Another twist to our work is that instead of using PEG, we used a somewhat different polymer that turns out to be as good as and perhaps even better than PEG in extending circulation of the protein in the body."

There are many protein-polymer based medications in use today, such as human growth hormones, drugs to stimulate blood cell formation in cancer patients and anti-viral agents. Chilkoti will be reviewing existing protein-polymer drugs to determine if the new technique can improve their effectiveness.

In their experiments, the researchers used myoglobin, a protein responsible for creating the red pigments that give meat its color. Instead of creating a chemical bond between myoglobin and the polymer, the Duke researchers chose a specific spot on the protein, known as the N-terminus, and then grew the polymer from that specific location. Every protein has an N-terminus, so this method should be broadly useful, Chilkoti said.

After demonstrating they could create a stable compound using the new method, the researchers tested how well it worked by comparing its actions to the conventional compound in mice.

"The conventional compound - myoglobin - had a half-life of three minutes and was totally eliminated by two hours," Chilkoti explained. "By contrast, the new compound had a half-life 40 times greater and remained in circulation for 18 hours. The longer a protein remains in the system and is active, the more it helps the patient."

"The dramatic improvement in how the new compound acted encourages us that this new approach will have broad applications in improving the efficacy of many protein drugs," Chilkoti said.

Another benefit of this approach, according to Chilkoti, is that the polymer should naturally degrade in the body over time and be easily excreted. "Because the compound is biodegradable, we should in principle be able to make even larger protein-polymer combinations with potentially even better pharmacologic properties," he said.

The researchers plan to apply their invention to other protein-based therapies, such as for cancer and diabetes, to determine if they can improve effectiveness of the protein drug while reducing its undesirable toxic effects.

Other Duke Team members were Weiping Gao, Wenge Liu, J. Andrew Mackay, Michael Zalutsky and Eric Toone.

Headline: - Learning From Evolution How to Fine-Tune An Anti-Cancer Drug

Published by: - Medical News

Date of Publication: August 19, 2009

Source: - <http://www.medicalnewstoday.com/articles/161151.php>

Cancer remains a deadly threat despite the best efforts of science. New hopes were raised a few years ago with the discovery that the uncontrolled growth of cancer cells could be thwarted by blocking the action of proteasomes. Biochemists at the Technische Universitaet Muenchen (TUM) have illuminated a reaction pathway that does just that, in collaboration with researchers from Nereus Pharmaceuticals, based in San Diego, California. In the current issue of the Journal of Medicinal Chemistry, they report insights that could potentially lead to the development of custom-tailored anti-cancer drugs.

What makes cancer cells so dangerous is that they proliferate much more rapidly than other cells. An important contribution to this capability is made by a particular group of proteins, the so-called kinases. And it's against the kinases that many cancer drugs in development today take aim. Another promising approach came to light a few years ago with the discovery that the proliferation of cancer cells could also be arrested through proteasome inhibition. Yet the first drug to employ this strategy caused a number of severe side-effects. Despite that, the drug is expected to generate revenues of more than a billion U.S. dollars this year.

In the search for alternatives, San Diego-based Nereus Pharmaceuticals homed in on a species of marine bacteria known as *Salinispora tropica*. These bacteria produce a small molecule that kills affected cells by disabling proteasomes, which serve as their waste processing plants. "In the life cycle of a cell, proteins are always being built up that will need to be demolished after they have done their work," explains TUM Professor Michael Groll, leader of the research team in Munich. "If this breakdown is blocked, the cells choke on their own waste."

After promising preclinical trials, the bacteria-produced Salinosporamide A (NPI-0052; Sal-A) has advanced into human clinical trials. "Over millions of years, the bacteria developed this substance into a perfect weapon," says Dr. Barbara Potts, vice president for chemical and oncological development at Nereus Pharmaceuticals. The ideal cancer drug would kill only cancer cells, while doing the least harm possible to healthy cells. The researchers took a closer look at the pathway for this reaction, in the hope that they might better understand the mechanism and the best approach to future generation analogues.

The research team of Barbara Potts and Michael Groll managed to produce crystals of proteasomes blocked by Salinosporamide A and determined, through X-ray crystallography, the precise arrangement of the atoms. It became clear why the bacterial poison is so effective: The molecule fits an opening in the proteasome like a key, and locks it up. A subsequent reaction transforms the molecule to a complex that can no longer be detached, in effect breaking off the key in the lock. Vital processes come to a halt.

Halogen-hydrocarbons are favored in industrial chemistry, because the halogen atom can be easily separated from other groups. It's just this trick that the *Salinispora tropica* bacterium employs in the case of Salinosporamide A. It uses a chloride as its so-called "leaving group" to trigger an internal reaction forming a ring-like bond. If the ring is closed, the lock is jammed.

The researchers next produced variants of Salinosporamide A and once again succeeded in crystallizing them and using X-ray techniques for structural analysis. By replacing the chlorine atom with fluorine, they were able to observe the progress of the reaction. After the key had been stuck in the lock for one hour of reaction time, the biochemists were still able to pull it out again. A few hours later, the fluorine was split off, and the lock was blocked.

"After the millions of years that have gone into the evolutionary development of this method in bacteria, it's unlikely that a better way to block the proteasome is even possible," Groll says. "Now that we know how the best possible reaction proceeds, we can alter it in targeted ways with the aim of developing tailored, effective proteasomal drugs that will have improved safety and efficacy."

Headline: - Scientists Control Living Cells With Light; Advances Could Enhance Stem Cells' Power

Published by: - Science Daily

Date of Publication: - August 12, 2009

Source: - <http://www.sciencedaily.com>

University of Central Florida researchers have shown for the first time that light energy can gently guide and change the orientation of living cells within lab cultures. That ability to optically steer cells could be a major step in harnessing the healing power of stem cells and guiding them to areas of the body that need help.

The results, presented at the 2009 Conference on Lasers and Electro-Optics/International Quantum Electronics Conference, were discovered by a research team led by Aristide Dogariu, an optical scientist at the College of Optics and Photonics, and Kiminobu Sugaya, a stem cell researcher at the College of Medicine's Burnett School of Biomedical Sciences.

Long-term implications of the work include stimulating and controlling tissue regeneration for cleaner wound healing and the possibility of altering the shapes of cells and preventing malignant tumors from spreading throughout the body.

While optical techniques such as drilling microscopic holes with light or using the light as tweezers have shown promise in manipulating small pieces of matter, the UCF team explored the use of a gentler light energy. Their work showed for the first time that optically induced torques can affect components within cells that drive their motility -- their ability to move spontaneously -- and change the orientation of cells within cultures.

While earlier studies of cell manipulation have emphasized shielding the cell from the power of the light, Dogariu and Sugaya focused on using that energy to stimulate the cells' natural tendencies.

Living cells use energy to move actively and spontaneously. To influence them without jeopardizing their chemical makeup was a tremendous challenge. Dogariu and Sugaya began exploring the idea of moving an entire cell by focusing on its inner mechanisms. Inside the cells there are slender rods made up of a protein called actin.

"Actin rods are constantly vibrating, causing the cells to move sporadically" Sugaya said. The researchers demonstrated that low-intensity polarized light can guide the rods' Brownian motion to ever-so-slowly line up and move in the desired direction.

"Stronger light would simply kill them," Dogariu said. "We wanted to gently help the cells do their job the way they know how to do it."

A time-lapse video shows that after more than two hours of exposure to light with specific characteristics, a group of stem cells migrates from a seemingly random mix of shapes, movement and sizes to a uniform lineup.

Headline: - Growing limbal stem cells without using human scaffold.

Published by: - The Hindu

Date of Publication: - July 30, 2009

Source: - www.hindu.com

Stem cells may get infected or contract some unknown diseases if amniotic membrane is used

Polymer scaffold

Limbal stem cells from the healthy eye were expanded on the polymer scaffold and transplanted to the damaged eye.

Using stem cells present in the limbus region of eye to restore vision in people who have damaged cornea and limbus as a result of chemical or thermal injuries, or are suffering from Stevens-Johnson syndrome is nothing new. It is being done for the last few years.

Corneal cells are destroyed or worn out every day. The limbal stem cells produce new corneal cells and ensure that eyesight is not affected. Restoring sight in the damaged eye is done by transplanting the limbal stem cells from the healthy eye to the damaged eye.

Since removal of large amounts of limbal stem cells from the undamaged eye may lead to depletion of stem cells, doctors usually remove a small quantity of limbal stem cells from the healthy eye and expand (increase in number) them in the laboratory by culturing.

Amniotic scaffold

The conventional way of culturing the stem cells to increase their numbers is to use a human amniotic membrane, a thin membrane found in the placenta, as a scaffold. But scientists are not very comfortable using a human membrane — there are chances of stem cells getting infected or contracting some unknown disease.

Scientists have been on a hot pursuit of a non-living material such as collagen as a scaffold. The Vision Research Foundation (Sankara Nethralaya), Chennai, along with the Nichi-in Centre for Regenerative Medicine, Chennai, appear to have found one such scaffold.

Polymer scaffold

Scientists have used a polymer as a scaffold to grow stem cells harvested from the eyes of rabbits. The results of the animal study have been published in the journal of Tissue Engineering: Part A.

Twelve rabbits have been studied and two used as control. One eye of all the rabbits was damaged and limbal stem cells from the other eye were taken and expanded on the polymer scaffold. When transplanted to the damaged eye, seven rabbits had their sight fully restored. There was partial success with two rabbits and failure in three.

Problem overcome

“Partial success was because the rabbits which underwent transplantation earlier kept scratching their eyes during the initial days,” said Dr. Samuel Abraham, Director of Nichi-in Centre. “So we put a restraint (cover) on the eye of others and thereafter everything went well.”

According to him, the quantity of undifferentiated stem cells is more when the polymer scaffold was used. And more the stem cells better are the chances of vision restoration.

The polymer was first standardised on humans. Corneal limbal stem cells derived from human cadavers were used for standardisation. It was later standardised in rabbits at Sankara Nethralaya.

More research needed

More research needs to be done on animals and trials in humans before the safety and efficacy of the technique can be assessed.

Headline: - Biomarkers May Help Predict Risk Of Alzheimer's Disease In Patients With Mild Cognitive Impairment

Published by: - Science-Daily

Date of Publication: - July 30, 2009

Source: - www.sciencedaily.com

Several cerebrospinal fluid (CSF) biomarkers showed good accuracy in identifying patients with mild cognitive impairment who progressed to Alzheimer disease, according to a new study.

Alzheimer disease (AD) is the most common cause of dementia, affecting more than 15 million individuals worldwide. Because of the type of progression of the disease, there is a need for methods enabling early diagnosis. "Treatments would need to be initiated very early in the disease process, before the neurodegenerative process is too severe. Much focus has thus been directed on patients with mild cognitive impairment (MCI), which is a syndrome characterized by cognitive impairment beyond the age-adjusted norm, but not severe enough to fulfil the criteria for dementia," the authors write.

Biochemical changes in the brain are reflected in the CSF, and intense research efforts have been made to develop biomarkers for the central pathogenic processes in AD that can be used as diagnostic tools. Some studies have shown that CSF biomarkers may be useful to identify incipient (beginning) AD in patients with MCI, but most of these studies have been small and conducted at single centres, according to background information in the article.

Niklas Mattsson, M.D., of the Sahlgrenska Academy at the University of Gothenburg, Mölndal, Sweden, and colleagues conducted a multicenter study to assess the diagnostic accuracy of the CSF biomarkers β -amyloid1-42 (A β 42), total tau protein (T-tau), and tau phosphorylated at position threonine 181 (P-tau) in identifying incipient AD in a large group of patients with MCI. The study had two parts: a cross-sectional study involving patients with AD and controls to identify biomarker cutoff levels, followed by a prospective cohort study involving patients with MCI, conducted 1990-2007. A total of 750 individuals with MCI, 529 with AD, and 304 controls were recruited by 12 centers in Europe and the United States. Individuals with MCI were followed for at least 2 years or until symptoms had progressed to clinical dementia.

During follow-up, 271 participants with MCI were diagnosed with AD and 59 with other dementias. The researchers found that the A β 42 assay in particular had considerable intersite variability. Patients who developed AD had lower median (midpoint) A β 42 and higher P-tau and T-tau levels than MCI patients who did not develop AD during follow-up. Cut-offs with sensitivity (the proportion of affected individuals who have a correct positive test result for the disease that the test is intended to reveal) set at 85 percent were defined in the AD and control groups and tested in the MCI group, where the combination of A β 42/P-tau ratio and T-tau identified incipient AD with a sensitivity of 83 percent and specificity (the proportion of individuals with correct negative test results for the disease the test is intended to reveal) of 72 percent.

"We determined in a large multicenter study that the CSF biomarkers A β 42, T-tau, and P-tau can be used to predict with good accuracy which MCI patients will develop AD, as previously found in smaller studies. This multicenter collaboration avoids several of the risks of biases associated with single-center studies by having included substantially more patients than previous studies. Cerebrospinal fluid biomarker changes were found to be significantly associated with incipient AD. However, the considerable intercenter variations in assays and patient assessments described point to a need for standardization of sample handling as well as of clinical assessments. Although each memory clinic center followed up its cohorts prospectively and used

established clinical criteria, a limitation of the present study is the lack of fully harmonized study protocols for all centers, which might account for some of the intercenter variations that we observed," the researchers write.

"Using CSF A β 42, T-tau, and P-tau in memory clinics will result in some false-positive cases, as well as false-negative cases, and the biomarkers may therefore be useful primarily as screening tools, selecting individuals for a detailed further clinical follow-up. Furthermore, they may be useful in enriching study populations for clinical trials of future disease-modifying AD treatments. Until such treatments become available, however, these tests are not generally appropriate for routine clinical use because it is not currently possible to alter the development of AD."

Headline: - Researchers Rapidly Turn Bacteria into Biotech Factories

Published by: - Science-Daily

Date of Publication: - July 28, 2009

Source: - www.sciencedaily.com

High-throughput sequencing has turned biologists into voracious genome readers, enabling them to scan millions of DNA letters, or bases, per hour. When revising a genome, however, they struggle, suffering from serious writer's block, exacerbated by outdated cell programming technology. Labs get bogged down with particular DNA sentences, tinkering at times with subsections of a single gene ad nauseam before moving along to the next one.

A team has finally overcome this obstacle by developing a new cell programming method called Multiplex Automated Genome Engineering (MAGE). Published online in *Nature* on July 26, the platform promises to give biotechnology, in particular synthetic biology, a powerful boost.

Led by a pair of researchers in the lab of Harvard Medical School Professor of Genetics George Church, the team rapidly refined the design of a bacterium by editing multiple genes in parallel instead of targeting one gene at a time. They transformed self-serving *E. coli* cells into efficient factories that produce a desired compound, accomplishing in just three days a feat that would take most biotech companies months or years.

"We initiated the project to close the gap between DNA sequencing technology and cell programming technology," explains graduate student Harris Wang, the paper's co-first author.

"The goal was to use information gleaned from genetics and genomics to rapidly engineer new functions and improve existing functions in cells," adds postdoctoral researcher Farren Isaacs, the other first author. "We wanted to develop a new tool and demonstrate how to apply it; we were determined to hand labs a hammer and a nail."

The key was to break free of linear genetic engineering techniques and move beyond the serial manipulation of single genes.

The researchers selected a harmless strain of the intestinal nemesis *E. coli* and added a few genes to its solitary circular chromosome, coaxing the organism to produce lycopene, a powerful antioxidant that occurs naturally in tomatoes and other vegetables. Now they could focus on tweaking the cells to increase the yield of this compound.

Traditionally, labs would accomplish this type of transformation by using recombinant DNA technology, also known as gene cloning, a complicated technique that involves isolating, breaking up, reassembling, and then reinserting genes.

The Church lab researchers took a different approach, blending an engineer's logic with a biologist's appreciation for complexity. "Genes function in teams, not in isolation," says Wang. "Cloning often encourages us to ignore the interdependence of genes and oversimplify the cellular system. We might forget, for example, that one mutation can strengthen or weaken the effects of another mutation."

"It's nearly impossible to predict which combinations of mutations will confer the desired behavior," explains Isaacs. "Biology is so complex that we don't know the optimal solution."

So the team retooled evolution to generate genetic diversity at an unprecedented rate, increasing the odds of finding cells with desirable properties.

The *E. coli* bacterium contains approximately 4,500 genes. The team focused on 24 of these—honing a pathway with tremendous potential—to increase production of the antioxidant, optimizing the sequences simultaneously. They took the 24 DNA sequences, divided them up into manageable 90-letter segments, and modified each, generating a suite of genetic variants. Next, armed with specific sequences, the team enlisted a company to manufacture thousands of unique constructs. The team was then able to insert these new genetic constructs back into the cells, allowing the natural cellular machinery to absorb this revised genetic material.

Some bacteria ended up with one construct, some ended up with multiple constructs. The resulting pool contained an assortment of cells, some better at producing lycopene than others. The team extracted the best producers from the pool and repeated the process over and over to further hone the manufacturing machinery. To make things easier, the researchers automated all of these steps.

"We accelerated evolution, generating as many as 15 billion genetic variants in three days and increasing the yield of lycopene by 500 percent," Harris says. "Can you imagine how long it would take to generate 15 billion genetic variants with traditional cloning techniques? It would take years."

The pathway the team refined plays a role in the synthesis of many valuable compounds, ranging from hormones to antibiotics, so the reprogrammed bacteria can be used for a variety of purposes. In addition, the MAGE platform itself unlocks new possibilities.

"We decided to engineer in the context of biology, embracing evolution rather than trying to fit a square peg in a round hole," says Church. "This automated, multiplex technology will allow labs to engineer entire pathways and genomes and take cell programming to a whole new level."

This research is funded by NSF, DOE, DARPA, and the Wyss Institute for Biologically Inspired Engineering, NIH and NDSEG.

Headline:- No role of animals in spreading H1N1 virus: OIE

Published by : Business Standard

Source :- <http://www.business-standard.com/>

Even as the World Health Organisation (WHO) has declared the H1N1 influenza (swine flu) as a global pandemic, the World Animal Health Organisation (OIE) maintains that there is no role of animals (including swine) in spreading this virus. This, being a human disease, is basically a public health issue.

This United Nations body has also advised that the production, trade and consumption of hygienically produced pork and pork products can continue without any curbs.

The OIE has said that culling of pigs would not help to guard against public or animal health risks presented by the H1N1 influenza virus and that such measure is not recommended.

Several countries have banned the import of pigs and pork products from countries affected by the swine flu, severely denting the global trade in pork products. The pork exports from the US have been the worst hit as almost all major trade partners have put up restrictions on the inflow of all piggeries products from that country. The other pork exporting countries have also been adversely affected. The domestic sale of pork products has declined sharply in the swine flu-hit countries, dealing a severe blow to the pork-based industry.

However, the OIE feels that there is little scientific reason to put curbs on the pork industry. "A/H1N1 is indeed a public health issue for all worldwide but so far the role of animals has not been demonstrated in the epidemiology or spread," OIE director-general Bernard Vallat has said in a statement issued after the declaration of the swine as pandemic of phase 6 (highest risk) by the WHO.

The OIE's advisories to all nations on swine flu categorically state that the pork products handled in accordance with good hygienic practices are not a source of infection. "The imposition of ban measures related to the import from countries with human cases of A/H1N1 are pointless and do not comply with international standards published by the OIE."

However, at the same time, it has advised the national veterinary services to effectively monitor animal populations for clinical signs of disease.

The Indian piggeries sector has so far remained largely unaffected by the swine flu outbreak though the number of H1N1-positive human cases has touched 20 (as on Sunday). Pigs, in any case, account for only a small fraction of the country's total livestock population. Organised sector pig rearing is confined chiefly to Kerala, Bihar and Jharkhand. Nearly one-fourth of the country's total pig population is in the North-East where pork consumption is fairly common. Elsewhere, only small numbers of backyard-reared pigs are present, that too largely in Uttar Pradesh, Bihar, Jharkhand, Andhra Pradesh, Kerala and Tamil Nadu.

According to animal scientists of the Indian Council of Agricultural Research (ICAR), swine flu has seldom been reported as a major disease of pigs in India.

Headline: - TB vaccine made more effective?

Published by: - The Hindu

Date of Publication: - June 04, 2009

Source: - <http://www.hindu.com>

Scientists claim to have unravelled one of clinical medicine's enduring mysteries on the waning resistance of the tuberculosis vaccine and in the process developed a stronger antidote for the disease.

"Our findings represent nearly a 180-degree reversal from the dogma of the last 60 years -- that the TB vaccine stopped working because it became over-attenuated and was too 'wimpy' to be effective," said Douglas Kernodle, associate professor of Medicine at the Vanderbilt University Medical Centre, US.

Kernodle and his team, including research instructor Lakshmi Sadagopal, found that the TB vaccine has acquired some traits that make it less effective in evoking sustained immune response.

However, when these traits were removed from the TB vaccine, it induced stronger immune responses in mice, the researchers found.

The current TB vaccine, known as BCG, has been in use since 1920s.

It was developed by weakening (attenuating) a strain of bacteria that causes TB in cows, which is genetically 98 per cent identical to the human TB germ.

"Our research targeted genetic duplications that actually make the BCG vaccine immune-evasive as infected cells in the body produce oxidants to destroy harmful bacteria," Sadagopal told PTI in an email interview. — PTI

Headline: - MicroRNAs Circulating In Blood Show Promise as Biomarkers to Detect Pancreatic Cancer

Published by: - The Times of India

Date of Publication: - September 05, 2009

Source: - <http://www.medicalnewstoday.com>

A blood test for small molecules abnormally expressed in pancreatic cancer may be a promising route to early detection of the disease, researchers at The University of Texas M. D. Anderson Cancer Center report in the September edition of the journal *Cancer Prevention Research*. The team's analysis of four microRNAs (miRNA) found in the blood plasma of pancreatic cancer patients is proof of principle to further develop a blood test for this evasive disease, said senior author Subrata Sen, Ph.D., associate professor in M. D. Anderson's Department of Molecular Pathology.

"Increased expression of microRNAs is known to be involved with specific genetic pathways and processes responsible for the development of cancer-associated changes in cells," Sen said. "Detection of elevated levels of miRNAs in blood plasma of pancreatic cancer patients as informative biomarkers of disease appears to be a promising, novel approach for developing a minimally invasive assay for detecting this disease."

There is no accurate, noninvasive way to detect pancreatic cancer, the fourth-leading cause of cancer-related deaths in the United States. Fewer than 5 percent of patients survive to five years. MicroRNAs are single-stranded bits of RNA consisting of 18 to 24 nucleotides that regulate the messenger RNA (mRNA) expressed by genes to tell a cell's protein-making machinery what protein to make.

The four targeted microRNAs previously had been associated in varied ways with pancreatic cancer or with precancerous lesions. Expression of the four was analyzed in 28 patients with pancreatic cancer and 19 healthy people. The four combined markers accurately identified 64 percent (sensitivity) of the pancreatic cancer cases and correctly identified 89 percent of those without disease (specificity). That degree of sensitivity and specificity are good for a pilot study but don't yet rise to the levels required for translation in the clinic, which would require investigating more circulating microRNAs in blood in a larger sample of persons representing different stages of the disease and healthy controls.

The study's small sample size, which compared only the extremes of pancreatic cancer or the complete absence of the disease, is a limitation, but the results justify continued development of this strategy, Sen said.

One of the miRNAs in the study is overexpressed in precursor lesions that can lead to full pancreatic cancer. "The fact that a microRNA reported to be overexpressed in pre-invasive pancreatic cancer could be detected

in blood plasma from pancreatic cancer patients raises the possibility that a blood test for detecting pre-invasive pancreatic cancer may become a reality," Sen said. Marker miRNAs used in the study were miR-21, miR-210, miR-155 and miR-196a.

Sen and colleagues are working with the Early Detection Research Network of the National Cancer Institute to develop studies with larger sample sizes that are designed to test miRNA markers associated with different grades and stages of the disease. The project was funded by grants from the National Cancer Institute.

Headline: - New Test for Safer Biomedical Research Results

Published by: - Science-Daily

Date of Publication: - August 29, 2009

Source: - <http://www.sciencedaily.com/releases>

In biomedical research with living cells in the culture dish, contamination with bacteria, viruses or other fast-growing cells is always a risk. Scientists have now developed a test system for fast and cost-effective detection of such contaminations. The new method will contribute to making biomedical research results safer and reproducible.

In cancer research, as in most other biomedical sciences, they are playing a key role: living cells, kept in sterile plastic containers with red culture media populating incubators in laboratories around the world. But do researchers always know what is really living in their culture dishes?

Under the microscope, different cell lines are almost impossible to distinguish from each other. When these important research objects stop growing without apparent reason – is it because of the manipulations by the scientists or because of an invisible viral or bacterial infection?

Contaminations with other cell lines or pathogenic agents are a common and well-known problem. Often they are the reason why cell experiments fail to produce useable or reproducible results. Even worse, laboratory staff can get infected with dangerous pathogens from a cell culture.

To make those important cell culture experiments safer, DKFZ researchers Dr. Markus Schmitt and Dr. Michael Pawlita have developed a test which is able to identify 37 different cell contaminations in a single run. The researchers have tested the system in over 700 samples from different research labs and have now published their results.

The method called "Multiplex cell Contamination Test" (McCT) detects not only wide-spread viruses but also a number of mycoplasmas, which are considered the major contaminants of cell cultures. In addition, the test checks the cells for their origin. Thus, if dog genetic material is found in what are supposed to be monkey cells, then a contamination of the cell culture is obvious. The test also includes detection of

commonly used standard cell lines. Contamination with the fast-growing cancer cell line HeLa, for example, is a dreaded source of false results.

Pawlita and Schmitt found contaminations in a high percentage of cell samples. Twenty-two percent of tested cultures were contaminated with one of the various types of the parasitic bacterium called mycoplasma. "What we noticed about the results," says Markus Schmitt, "was that contaminations were frequent in some laboratories, while others sent in cultures that were constantly clean. Thus, care in laboratory work seems to play an important role."

The test is highly specific and needs no more than ten copies of foreign DNA in the cell sample to be positive. This is a sensitivity which is comparable to or even higher than those of previously available commercial mycoplasma tests. McCT results are reproducible to 99.6 percent. The method is based on multiplication of specific DNA sequences by polymerase chain reaction and subsequent detection of the multiplied DNA regions. A special advantage of the new test is that it can be carried out on a high-throughput basis. The DKFZ researchers can manage up to 1,000 tests per week.

Schmitt und Pawlita offer the service to external scientists and research institutes via the Steinbeis Transfer Center "Multiplexion", a DKFZ spin-off.

Section – B: Nano Biotechnology

Headline: - Bio-Nanomachines: Proteins As Resistance Fighters

Published by: - Science-Daily

Date of Publication: - August 18, 2009

Source: - www.sciencedaily.com

Friction limits the speed and efficiency of macroscopic engines. Is this also true for nanomachines? A Dresden research team used laser tweezers to measure the friction between a single motor protein molecule and its track. The team found that also within our cells, motors work against the resistance of friction and are restrained in its operation usually by far not as much though as their macroscopic counterparts.

These first experimental measurements of protein friction could help researchers to better understand key cellular processes such as cell division which is driven by such molecular machines. (*Science*, August 14, 2009)

Friction is the force that resists the relative motion of two bodies in contact. The same is true on the nanoscale: Molecular motors have to fight the friction created between them and their tracks. However, since the frictional forces acting on such motors had not been measured before, it was not known how they depend on the speed and the direction of motion.

Friction Slows Down Proteins

Scientists in Dresden at the Biotechnology Center (BIO-TEC) of the Technical University of Dresden and at the Max Planck Institute of Molecular Cell Biology and Genetics (MPI-CBG) immobilized the molecular motor kinesin on a microsphere which was held by laser tweezers and dragged over its track, a so-called microtubule. In this manner, the friction force between the motor and its microtubule track was measured very precisely. "Just like for macroscopic machines, protein friction limits the speed and efficiency of the small bio-motors", says Erik Schäffer, group leader at the BIOTEC and Jonathon Howard, director and group leader at the MPI-CBG.

The researchers explain that the protein, in the absence of an energy source, takes eight nanometer (a millionth of a millimeter) wide "diffusive hops", corresponding to the length of the tubulin subunits that make up a microtubule. The motors step from one tubulin subunit to the adjacent one by forming a new bond with the microtubule filament as another bond is broken. When pulled by the tweezers, the energy released from these breaking bonds is lost as friction.

Efficient nanomachines

Protein friction also gives insight into the efficiency of kinesin. "About half of the energy from the motor's fuel ATP is dissipated as friction between the motor and its substrate" Howard comments. Schäffer adds: "What remains after further dissipation inside the motor is used for mechanical work—the efficiency is usually much better than for man-made machines". The dissipated energy is eventually converted to heat, that contributes to the heating of our body. Thus, for example our muscles are partly heated by protein friction as the muscle motor proteins do their work.

Section - C: Pharmaceutical Biotechnology

Headline: - India has immense potential to take on global pharma markets

Published by: - The Hindu

Date of Publication: - September 16, 2009

Source: - <http://beta.thehindu.com/business>

India has immense potential to take on global pharmaceutical markets, a joint report by KPMG and industry body CII said.

Primary problems faced by the Indian pharma sector today are issues of "intangibles" — namely, lack of skilled manpower, lack of consistency and quality, lack of clarity on IPR and patenting, regulatory failures and a highly fragmented sector — the report said.

Addressing these issues comprehensively will help the sector leapfrog into the global pharmaceutical market and overtake China, its closest competitor, CII Pharma Summit's Chairman and Hikal Ltd's Vice-

Chairman and Managing Director, Jai Hiremath, said at the CII-organised Seventh International Pharmaceutical Conference here.

“The challenges are little hurdles, no doubt. But largely, they are a demonstration of the Indian pharma sector’s potential and a reflection of its success. Over the next ten years or so, we should work closely on addressing these issues, increasing R&D spends and patent filings and work towards consolidating the industry,” CII Western Region Chairman and Forbes Marshalls Director, Naushad Forbes, said.

This will help Indian firms leverage their strengths in the global market, he said. India is ranked as the world’s fourth largest pharmaceutical market in terms of volume and the 13th largest in terms of value. But despite its success, the Indian pharma industry accounts only for 3 per cent of the Contract Research and Manufacturing Services (CRAMS) market, the report said.

This indicates that the country has great potential to become a global market leader. However, it also signals certain issues and roadblocks which Indian companies are facing that deter them from gaining significant market share and realising their true potential, the report said.

Calling on the regulatory authorities and the Government to exercise effectiveness, Mr. Hiremath said “over the years, India has emerged as the hub for Contract Research and Manufacturing Services. There has also been substantial improvement in technology and R&D spends.”

“However, the sector now needs to collectively address pressing issues in order to maintain momentum. The Government needs to ensure adequate clarity on IPR and data protection and issues such as ever-greening which are frivolous should not be encouraged by regulatory authorities,” he said.

Participating in a CEO roundtable, industry leaders called for collective efforts from the sector to overcome present challenges and truly realise the industry’s potential in the global scenario.

There was a need to create a conducive ecosystem and address burning concerns such as the need for incremental and breakthrough innovation, need for skilled manpower and change in mindsets.

They identified branded generics as a potential area for the Indian pharma sector to focus on and said that cost-effectiveness and trained manpower were the inherent strengths of the sector. They also asked the industry to cultivate innovative mindsets and increase people productivity.

Headline: - Yeast Unravels Effects of Chemotherapy Drugs

Published by: - Science Daily

Date of Publication: - September 11, 2009

Source: - <http://www.sciencedaily.com/releases>

Until now, the mode of action of nitrogen-containing bisphosphonate (N-BP) cancer drugs, used to relieve bone pain and to prevent skeletal complications in bone metastasis, has been almost entirely unknown.

Researchers writing in BioMed Central's open access journal *Genome Biology* have used 'barcoded' yeast mutants to identify new biological processes involved in the cellular response to N-BPs, opening up opportunities for the development of new anticancer drugs.

Daniela Delneri, from the University of Manchester, UK, worked with Gianluca Tell and an Italian team of researchers to carry out the experiments. Delneri said, "We discovered two novel biological processes involved in the cytotoxic effects of the N-BPs, DNA damage and microtubule assembly, and, thanks to the novel 'barcode' approach, these could be linked directly to the responsible genes, DBF4 and TBCB."

The researchers used a collection of thousands of yeast mutants, each identified by a unique molecular barcode. By evaluating which yeasts grew best when exposed to N-BPs, they were able to identify potential drug targets and gain insight into the molecular changes occurring in cells exposed to such drugs. Speaking about the results, Delneri said, "Neither DBF4 nor TBCB have been described before as N-BP targets, and these findings may open up new opportunities for the development of new compounds with antitumor activity".

Headline: - Scientists find three new gene links to Alzheimer's

Published by: - The Times of India

Date of Publication: - September 8, 2009

Source: - <http://timesofindia.indiatimes.com/>

LONDON: Scientists have found three new major genetic links to Alzheimer's, affecting up to 20% of people with the brain-wasting disease. They said it was the most significant such discovery in 15 years.

Two large studies found that the three new genes join the better known APOE4 gene as significant risk factors for the most common cause of dementia.

"If we were able to remove the detrimental effects of these genes through treatments, we could reduce the proportion of people developing Alzheimer's by 20%," said Julie Williams, a professor of Neuropsychological Genetics at Britain's Cardiff University.

Alzheimer's disease affects more than 26 million people globally, and has no cure or good treatment. The need for effective remedies is pressing, with the number of cases forecasted to go beyond 100 million by 2050.

Current drugs can only delay the symptoms endured by patients, who lose their memories, the ability to find their way around and to care for themselves.

Williams, who led one of the two studies published in Nature Genetics, said that in Britain alone, eradicating the effects of the three new genes would mean almost 100,000 people could avoid the disease. She said the findings were the most significant genetic discoveries for Alzheimer's in the 15 years since APOE4 was found to be linked, and said drug companies had shown a keen interest in their research.

Williams and colleagues at Cardiff's Medical Research Council Center for Neuropsychiatric Genetics and Genomics carried out a genome wide association study - a scan of the entire genetic map - involving more than 16,000 people from eight countries. They identified two new genes: Clusterin and PICALM - that increase the risk of developing Alzheimer's.

A second genome wide study conducted by Philippe Amouyel and colleagues at the Institut Pasteur de Lille in France, studied more than 6,000 people with Alzheimer's and nearly 9,000 healthy people in France, Belgium, Finland, Italy and Spain. They identified Clusterin and a third gene called CR1.

Amouyel said the disease risks associated with each gene were difficult to quantify, and said all three genes were relatively common. The scientists also stressed that a yet unknown combination of many genetic and other environmental factors also cause Alzheimer's.

The researchers said Clusterin may explain 10% of Alzheimer's cases, PICALM around 9% and CR1 4%. By comparison, 20 to 25% of Alzheimer's cases are linked to APOE. Three gene variations have also been associated with rare, early-onset forms of Alzheimer's that run in families. Identifying the genes can help researchers understand the underlying causes of a disease and design drugs to fight them.

Michael Owen, director of the Cardiff center, said their study also found evidence that other genes could play a role in the risk of developing Alzheimer's. "It's a bit like we have been fishing with a fishing net and we've pulled out some fish. We know there are more fish there, and with a finer mesh net we can catch them," he said. The Cardiff team now plans a further study involving 60,000 participants to look deeper into genetic causes of Alzheimer's.

Headline: - Cipla to produce biotech drugs

Published by: - Business Standard

Date of Publication: - September 8, 2009

Source: - <http://www.business-standard.com/india/news>

Cipla, the country's second-largest drug company, will foray into the production of biotechnology medicines soon. The company is planning to set up a 50:50 joint venture partnership with a Chinese firm. The JV will be based in India and will manufacture and market bio-similar products (off patent biotechnology medicines) for domestic and overseas markets.

Confirming the development, a Cipla official said the identity of the JV partner cannot be disclosed until the JV is signed. "We are in the process of signing the JV agreement. The details will be shared once it's over," he said. However, the source pointed out that the Chinese counterpart is an established biotech company with products in the local market.

Cipla has been on the lookout for a biotech partner after its JV with Bangalore-based Avestha Gengraine Technologies (Avesthagen) for a biopharmaceuticals development programme failed to take off. Under the Avesthagen-Cipla agreement, Avesthagen was to focus on research and product development and clinical trials, while Cipla — in addition to sponsoring the research — would also be responsible for the commercialisation of the product.

The key area of focus for the Avesthagen-Cipla JV was recombinant products in the auto-immune segment. This was also to be extended to the cardio-vascular disease (CVD) and cancer segments. The Cipla official said the Chinese JV will introduce off patent versions of biotechnology medicines in the local market by 2010. He did not reveal the size of the investment.

Headline: - Foreign pharma firms likely to beat Indian ones in developing vaccine

Published by: - Business Standard

Date of Publication: - August 12, 2009

Source: - <http://www.business-standard.com>

Despite the best efforts of Indian vaccine makers to develop the H1N1 (swine flu) vaccine, Swiss drug major Novartis and Australian vaccine maker CSL may be the first ones to bag the orders from the central government for its supply.

Both the companies, along with multinational drug firms such as Baxter and Sanofi Aventis, are months ahead in the race to develop a vaccine for the epidemic, Union health ministry officials feel.

In addition to the advanced stage of clinical trials, the experience of having developed flu vaccines will also come in handy for foreign vaccine makers, officials said.

Health minister Ghulam Nabi Azad had said on Monday the government would not wait for Indian-made vaccines to be ready, but will immunise all medical and para-medical staff working on the epidemic with the first available set of vaccines.

India is not alone in its pursuit to give advance orders for H1N1 vaccines. Over 35 countries have reportedly placed orders with companies such as CSL and Novartis to purchase the vaccines as and when these hit the market.

Three Indian companies have taken seed viruses from the World Health Organization (WHO) to develop the vaccine. They are the Hyderabad-based Bharat Biotech, Delhi-based Panacea and Pune-based Serum Institute. While all three are engaged in developing live virus vaccine, Serum is also working on inactivated (killed) virus vaccine.

Indian vaccine makers are best known for the development of the Hepatitis-B vaccine, the introduction of which resulted in drastic reduction in vaccine prices. In the case of H1N1, too, officials are looking forward to Indian vaccines as a means to reduce the cost of immunisation.

Government officials said Serum, which got the first permission to conduct clinical trials, will be ready with its vaccine by the year end. "The animal studies should begin by September 2009. Even if a fast-track approval happens without human trials (in the case of an emergency), the company will not be able to launch the medicine before December," they said.

Meanwhile, the foreign companies are expecting the vaccine launch to happen within the next two months.

Headline: - Cadila to apply for clinical trials for swine flu vaccine

Published by: - The Times of India

Date of Publication: - August 11, 2009

Source: - <http://timesofindia.indiatimes.com>

NEW DELHI: With an aim to launch vaccine for Influenza H1N1 A Virus (swine flu) in India, Cadila Pharmaceutical will seek the government's nod in two days for initiating clinical trials in this regard. Cadila Pharmaceutical Ltd (CPL) had set up a joint venture 'CPL Biologicals Pvt Ltd' with the US-based vaccine maker Novavax for manufacturing and developing a host of vaccines, including for swine flu, in India.

"The joint venture is going to file the application with the Drug Controller General of India (DCGI) in the next two days for phase-I clinical trials for swine flu vaccine," CPL Chairman and Managing Director Mr. Modi said. Modi expressed confidence that Cadila would be the first Indian pharma company to launch the swine flu vaccine in India by December.

"If we get the permission of DCGI soon, then with the advanced technology available from our partner, (we) would be able to launch it in India by December this year," Modi said. With its existing facility, Cipla can produce up to one million doses of the vaccine per month, which can be scaled up to two million doses, Modi said.

"Novavax has already received permission for clinical trials from the US Federal Drug Administration and if we get it soon, we can simultaneously start the trials," he added. The government has already indicated that swine flu related applications it would clear on a fast track basis and the company is hopeful of getting instant approval for it, Modi added. He said to protect from swine flu pandemic, two dosages of the vaccine are required over two weeks.

The JV has already started building a facility with an estimated investment of Rs 100 crore. In the joint venture Cadila has 80 per cent stake and the remaining 20 per cent is held by Novavax.

Besides this, Cadila Pharma also holds 5.75 per cent stake in Novavax Inc US and has a position on the board of directors of the US-based company.

Headline: - Ranbaxy, Aurobindo get USFDA nod for migraine drug

Published by: - Business Standard

Date of Publication: - August 11, 2009

Source: - <http://www.business-standard.com>

Pharma majors Ranbaxy and Aurobindo Pharma today said that they have received final approval from the US Food and Drug Administration (USFDA) to manufacture and market Sumatripan Succinate.

While Ranbaxy got approval for 25 and 50 mg variants of the drug, Aurobindo got the approval for 100 mg tablets apart from 25 and 50 mg tablets.

The Office of Generic Drugs, USFDA, has determined the Ranbaxy formulations to be bio-equivalent and have the same therapeutic effect that of the reference listed drug Imitrex manufactured by GlaxoSmithKline.

The drug is used in the treatment of migraine in adults. Ranbaxy shares were trading at Rs 275.25, nearly 14.25 per cent higher than Monday's close. Aurobindo stock was trading at Rs 615.05, nearly 3.35 per cent down from Monday's close.

Section - D: Agriculture Biotechnology

Headline: - Novel Mechanism Revealed For Increasing Recombinant Protein Yield in Tobacco

Published by: - Science-Daily

Date of Publication: - August 6, 2009

Source: - <http://www.sciencedaily.com//>

Elastin-like polypeptides (ELPs) cause plants to store GM proteins in special 'protein bodies', insulating them from normal cellular degradation processes and increasing the overall protein yield. Researchers have visualised the mechanism by which the synthetic biopolymer increases the accumulation of recombinant proteins.

Rima Menassa worked with a team of researchers from Agriculture and Agri-Food Canada in London, Ontario, to develop and test the ELP tags by targeting an ELP-green fluorescent protein (GFP) fusion to

various organelles in the leaves of the tobacco plant. Tobacco is well-suited as a production system for recombinant proteins but the mechanism by which ELP fusions increase production yields in transgenic tobacco leaves was previously unknown. Menassa said, "ELP was shown to almost double the yield of GFP to 11% of total soluble protein when hyperexpressed in the endoplasmic reticulum (ER)".

Based on their confocal and electron microscopy analyses, the researchers suggest that ELP fusions targeted to the ER induce the formation of novel mobile protein body-like structures in leaves, which appear similar in size and morphology to the prolamin-based protein bodies naturally found in plant seeds. These bodies may be responsible for ELP's positive effect on recombinant protein accumulation by excluding the heterologous protein from normal physiological turnover.

The researchers targeted their ELP fusions to the cytoplasm, chloroplasts, apoplast and ER in *Nicotiana benthamiana* tobacco plants. They found that the ER was the only intracellular compartment in which the ELP significantly enhanced recombinant protein accumulation. They conclude, "An ER-targeted ELP fusion approach provides an effective strategy for depositing large amounts of concentrated heterologous protein within the limited space of the cell".

Headline: - Unlocking Genetic Diversity of Rice

Published by: - Science-Daily

Date of Publication: - August 2, 2009

Source: - [www. http://www.sciencedaily.com//](http://www.sciencedaily.com/)

By looking at what different types of rice have in common, a team of international scientists is unlocking rice's genetic diversity to help conserve it and find valuable rice genes to help improve rice production.

Rice is the world's most important food crop. Understanding its valuable genetic diversity and using it to breed new rice varieties will provide the foundation for improving rice production into the future and to secure global food supplies.

Recently published in the *Proceedings of the National Academy of Science*, an international research team of researchers scrutinized the genomes of twenty different types of genetically diverse rice used in international breeding with a wide range of different characteristics.

"We searched for snippets of DNA that distinguish each type of rice," says Dr. Ken McNally from the International Rice Research Institute (IRRI). "If the rice types share a favourable trait, like drought tolerance, high yield, or even desirable cooking quality characteristics, they are likely to also share the same DNA variation responsible for that trait."

Rice contains tens of thousands of genes, so finding a successful way to hunt through them all is a major breakthrough. IRRI maintains the International Rice Gene Bank containing over 109,000 types of rice, yet relatively few have been used in breeding programs.

Director General of IRRI, Dr. Robert Zeigler, says "If breeders know more about the genetic makeup of rice, they can use it more effectively. As we face more erratic changes in climate, we will increasingly rely on using the untapped diversity of rice to develop new and improved rice varieties."

This study represents a significant international collaboration across the globe, including researchers from countries in Asia, North America, and Europe. The work attracted scientists interested in both basic and applied science, from evolution, crop domestication, to practical breeding.

Dr. Jan Leach, University Distinguished Professor at Colorado State University, a co-author on the study, indicates that "the comprehensive SNP information is enabling the exploration of rice diversity not only for understanding how genes function in a growing and developing plant, but also for improving important rice traits related to disease resistance, drought tolerance, increased productivity, and human health benefits." Detlef Weigel, Director of the Max Planck Institute for Molecular Biology and collaborator on the project, agrees: "This work sets the stage for the next phase of unlocking the treasure trove of genetic diversity available at IRRI and other centres for rice breeding."

This research was published in the *Proceedings of the National Academy of Science (PNAS)*. It was done in collaboration with Colorado State University, Michigan State University, Perlegen Sciences, Inc., McGill University, and the Max Planck Institute for Developmental Biology, the Friedrich Miescher Laboratory of the Max Planck Society, and Cornell University with support from a consortium of institutions and donors including the Generation Challenge Program, and the United States Department of Agriculture.

Headline: - Protein That Triggers Plant Cell Division Revealed

Published by: - Science-Daily

Date of Publication: - June 12, 2009

Source: - <http://www.sciencedaily.com>

From the valves in a human heart to the quills on a porcupine to the petals on a summer lily, the living world is as varied as it is vast. For this to be possible, the cells that make up these living things must be just as varied. Parent cells must be able to divide in ways that create daughter cells that are different from each other, a process called asymmetric division. Scientists know how this happens in animals, but the process in plants has been a mystery.

Now Stanford biologists have found a plant protein that appears to play a key role in this type of cell division. The presence of the protein, called BASL, is vital to asymmetric cell division. In plant cells where it was absent, the cells did not divide.

"This is crucial information if we really want to understand plants' unique ways of making the different types of cells in their bodies," said Dominique Bergmann, an assistant professor of biology.

"For asymmetric cell division in animals, we know many of the proteins that control the process, but plants just don't make any of those proteins," Bergmann said.

By following where in the cell BASL resides during successful asymmetric cell divisions, they have discovered that BASL behaves like many of the proteins vital for animal asymmetric cell divisions, even though BASL's structure doesn't look like any of them.

Headline:- Kill Termites without Using Insecticides: Study

Published by: - The Times of India

Date of Publication: - June, 9 2009

Source: - <http://timesofindia.indiatimes.com>

NEW YORK: Termites can now be killed without using any chemical insecticides which may pave way for the development of natural protective shield for wooden material and crops, a new study headed by an NRI scientist suggests.

Ram Sasisekharan, Director of Harvard-MIT Division of Health Sciences and Technology at Massachusetts, has led the discovery of a novel method of blocking the immune system of these pests which helps them evade the deadly attacks of bacteria and fungi on their nests.

Termites normally secrete a form of an antimicrobial protein into their nests to prevent these pathogenic infections which can kill them. Scientists have identified a naturally found derivative of glucose called GDL which blocks the effects of the protective protein.

"GDL is relatively simple to make chemically. Also it can be genetically engineered to be produced in plants. It is conceivable that GDL or GDL like compounds can be designed to be used in the field to protect things from termites," Sasisekharan told PTI.

The researchers found that introduction of this natural, nontoxic and biodegradable substance on the termite nests causes quick deaths in colony from fungal infections.

The findings published in the journal 'Proceedings of the National Academy of Sciences' say that findings may provide a non-toxic method for protecting crops and buildings against termites and other destructive insects.

Section - E: Microbial Biotechnology

Headline: - Bacteria and Algae Act as Biocatalysts for Deep-sea Raw Material Deposition

Published by: - Science-Daily

Date of Publication: - June 4, 2009

Source: - <http://www.sciencedaily.com>

The sea floor is strewn with raw materials that could be very important in the future: Manganese and iron, but also rarer and more precious elements such as cobalt, copper, zinc and nickel, are present in great quantities in the form of deep-sea nodules and crusts. The deposition of such materials from seawater and sediment is the result of a process known as biomineralization.

Microorganisms such as bacteria and algae contribute to this process of nodule and crust accretion and catalyze the accumulation of metals, as has been shown by new research at the Institute of Physiological Chemistry and Pathobiochemistry at Johannes Gutenberg University Mainz. The new findings could, the scientists believe, contribute to an environment-friendly and sustainable use of valuable marine natural resources.

Competition for the resources on the seabed has already begun; the industrialized countries have already staked their claims and marked off regions with large re-serves of raw materials. "This is a potential source of international conflict," believes Professor Werner Müller of the University of Mainz. Once we understand exactly how the deep-sea nodules and crusts are created, we might perhaps in the not too distant future be in the position to develop strains of microorganisms that could very specifically "grow" important raw materials for us.

In the case of deep-sea crusts, a unicellular alga rather than a bacterium provides the bio-seed. The deep-sea crusts – also known as manganese or cobalt crusts – are found at depths of 800 to 2,400 meters and also contain significant quantities of valuable raw materials. They are created by coccolithophorides, a form of armoured algae that are completely encased in a protective shell of calcium carbonate. These algae live at a depth of around 100 metres. When they die, their protective shells fall to deeper levels where bonds with manganese ions are formed by means of chemi-cal transformation.

"Perhaps we can use nature as our model, so that in future we will also be able to exploit algae and bacteria to extract manganese and other metals from a seawater environment," explains Müller. This could help to defuse potential future conflict for resources and contribute to sustainable production, without damaging the deep-sea environment.

Headline: - Magnetic Microbe Genome Attracting Attention for Biotech Research

Published by: - Science-Daily

Date of Publication: - August 11, 2009

Source: - <http://www.sciencedaily.com>

The smallest organisms to use a biological compass are magnetotactic bacteria; however mysteries remain about exactly how these bacteria create their cellular magnets. In a study published online in *Genome Research*, scientists have used genome sequencing to unlock new secrets about these magnetic microbes that could accelerate biotechnology and nanotechnology research.

Oxygen is essential for human life, but it is corrosive and poisonous to many bacteria. Magnetotactic bacteria evolved a clever method of using the Earth's magnetic field to orient itself and swim downward – exactly the direction a microbe must move to locate low oxygen areas in lakes and oceans. To find the direction of the magnetic field, these bacteria synthesize nanoscale cellular structures called magnetosomes that contain crystals of naturally occurring magnetic minerals.

The shape and composition of magnetosomes are species- and strain-specific, suggesting that magnetosome synthesis is biologically controlled. Magnetosomes are currently difficult to harvest in large quantities or synthesize artificially, therefore deciphering how cells form magnetosomes is crucial if they are to be useful in new technologies.

Genetic analyses have been performed in closely related magnetotactic bacteria, but because magnetosomes are also found in other classes of bacteria, scientists do not yet have a clear picture of the genetic components necessary for magnetosome formation. Tadashi Matsunaga of the Tokyo University of Agriculture and Technology and colleagues recognized that by analyzing the genome of more distantly related magnetotactic bacteria, researchers may be able to clearly define the minimal gene set needed for magnetosome synthesis.

In this work, Matsunaga's group sequenced the genome of *Desulfovibrio magneticus* strain RS-1, a more distant relative of other magnetotactic bacteria previously studied, and is also known for the unique bullet-shape of its magnetosomes. "Understanding the genes that control the morphology of these magnetosomes would be a significant breakthrough," said Matsunaga, noting that RS-1 could be the key to opening up new applications for magnetosomes.

Comparing the RS-1 genome sequence to the genomes of other magnetotactic bacteria, the team determined that all magnetotactic bacteria contain three separate gene regions related to magnetosome synthesis. Surprisingly, they also found that magnetosome-related genes are very well conserved across different classes of bacteria. Matsunaga explained that this suggests that the core magnetosome genes may have been established in these bacteria by several horizontal gene transfer events, rather than being passed down through a lineage.

In addition to illuminating core magnetosome genes, the group expects that their work on RS-1 will be a stepping-stone to manipulation of magnetosomes for new technologies. Matsunaga said that further research with RS-1 "could open doors to the synthesis of morphologically controlled magnetosomes, and provide opportunities to their applications in electromagnetic tapes, drug delivery, magnetic resonance imaging, and cell separation." Scientists from the National Institute of Technology and Evaluation (Tokyo, Japan) and the Tokyo University of Agriculture and Technology (Tokyo, Japan) contributed to this study. This work was supported by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) of Japan.
