

IN THE NEWS

Asia gets its first Bio Safety Level-4 facility

Biovet, an integrated biotechnology firm in India, has launched Asia's first Bio Safety Level-4 manufacturing facility, specifically designed to enable product development and manufacturing of vaccines, such as foot and mouth disease (FMD) vaccine. The total cost of the two-phase project, the first devoted to FMD and the second addressing the problem of tuberculosis in goat and sheep, is Rs 1.9 billion (US\$47.5 million), said Dr. Krishna Ella, Chairman of Biovet.

Dr. Ella said that the facility, which is the second in the world, aims to address "the significant gap in the application of latest technologies for providing health care solutions for small and large animals". Dr. S.N. Singh, Managing Director of Biovet, said, "The containment measures deployed by Biovet are the first of its kind in India, ensuring that all aspects of the facility, air, water, sewage and biological waste are treated and completely decontaminated before being released into environment." (Source: economictimes.indiatimes.com)

China to launch billion-dollar GM programme

China is set to launch a five-year, 10 billion yuan (US\$1.4 billion) research programme into genetically modified (GM) crops, say the country's top agricultural biotechnology experts. The first generation of GM crops focused on insect resistance. This new programme will emphasise yield, quality, nutrition improvement and drought resistance, according to Dr. Huang Dafang, ex-director of the Institute of Biotechnologies of the Chinese Academy of Agricultural Sciences.

Funding for GM safety and ecology monitoring and surveillance will be included, to reduce risks such as undesired gene flow into conventional crops. Chinese policymakers' attitudes to GM crops are now more receptive, according to Dr. Huang. The injection of funding could lead to much quicker commercialisation of GM crops in China, say scientists. (Source: www.scidev.net)

Biopiracy foiled as the United States revokes bean patent

The United States Patent and Trademark Office (USPTO) has repealed a patent for a bean that opponents say amounts to biopiracy. Mr. Larry Proctor from Colorado, the United States, was issued a patent in 1999 for a new variety of bean called 'enola'. Mr. Proctor claimed he developed the bean from the *Phaseolus vulgaris* variety, commonly known as 'mayacoba', that he bought in a market in Mexico.

The International Centre for Tropical Agriculture (CIAT), Colombia, with the support of Mexican farmers and the Consultative Group on International Agricultural Research, filed a request in 2000 for re-examination of the patent. The case continued for seven years. In 2004, scientists published evidence that the enola bean is identical to at least six bean varieties in the gene bank of CIAT. The USPTO revoked Mr. Proctor's patent in April this year.

Mr. Víctor Villalobos, coordinator for international affairs at the Mexican Secretariat of Agriculture, Livestock, Rural Development and Fisheries, says it has been "demonstrated to the USPTO with scientific research that the enola bean is taxonomically, genetically and molecularly identical to the Mexican yellow bean".

Mr. Villalobos said that enola case is not the only Mexican fight against biopiracy. In December 2007 a Chinese company had tried to patent the nopal Mexican cactus, and in 2003 the European Patent Office revoked a patent obtained by German company DuPont for a variety of Mexican maize. Mr. Villalobos says that the Mexican government plans to build a Centre of National Phytogenetic Resources for Food and Agriculture in 2009 to protect the biodiversity of all Mexican seeds and provide more control over its genetic resources. (Source: www.scidev.net)

New biotechnology research projects in Pakistan

National Institute for Biotechnology and Genetic Engineering (NIBGE) of Pakistan will undertake eleven new research projects from July 2008. NIBGE sources mentioned that among these pro-

jects are: cloning of cellulase genes for ethanol production from plant biomass; chloroplast-based overexpression of pharmaceuticals to develop cost-effective therapeutics; and cloning, expression and characterization of INGAP encoded gene.

Other projects include: prospective means of diabetes amelioration; engineering and production of re-combination proteins for the diagnosis and control of hepatitis B virus infection; bio-control of pathogenic infection through competition using plant growth promoting rhizo bacteria; identification and characterization of ACC deaminase gene in specific plant growth promoting rhizo bacteria; finding single nucleotide polymorphism in cotton genome; and gene pyramiding through genetic engineering for increased salt tolerance in wheat.

Out of these 11 projects, Higher Education Commission has funded five, while the Ministry of Food and Agriculture will provide funding for two projects. Pakistan Atomic Energy Commission, Ministry of Science and Technology, and Pakistan Science Foundation will also finance some of the remaining projects. (Source: www.scidev.net)

China's first mAb drug plant to be automated

The engineering services firm Emerson, based in the United States, announced that it has been selected to digitally automate a new facility in China that will produce the country's first monoclonal antibody (mAb) drugs. China's Shanghai CP Guojian Pharmaceutical Company is building a new active pharmaceutical ingredient (API) production suite for the purpose, which will also house the largest mammalian cell-culture system in Asia.

Emerson has been chosen by Shanghai-based engineering procurement contractor M+W Zander to design and install its PlantWeb digital plant architecture, integrated with its DeltaV system and Foundation fieldbus instrumentation, for networking intelligent process instrumentation in order to speed the drug production process. To further speed the start-up, Emerson said it is supplying its AMS Suite software that communicates with smart field devices for "efficient commissioning".

Emerson's role will also be to reduce the complexity of field wiring as well as to support asset

management of the smart field devices, in addition to the configuration and integration of all field devices with the control system, and the provision of the necessary on-site services to validate the system before start-up.

The new plant, located in the Zhangjiang Hi-Tech Park in Shanghai, is expected to begin producing mAb drugs in China by August this year, and the company said it expects to meet international standards with the products made in the facility. (Source: www.outsourcing-pharma.com)

Bt cotton cultivation gains currency in India

Bt cotton is becoming popular in the Indian state of Haryana, and the average per hectare produce of cotton has gone up, according to state Agriculture Minister Mr. Harmohinder Singh Chatha. With the Bt cotton gaining popularity among the farmers, the average per hectare cotton production had greatly increased in the state, benefiting the farmers, he said.

The Minister also said that area under Bt cotton cultivation is likely to cover 90 per cent of the total area under cotton crop in Haryana this year. Cotton is one of the major cash crops in the state, which is grown over an area ranging between 450,000 hectares and 600,000 hectares. During the year 2007-2008, the average per hectare production of cotton was 663 kg as against 283 kg in 1966-1967, when Haryana was carved out as a separate state, he added. (Source: www.business-standard.com)

Filler

MARKET NEWS

Jubilant Organosys to acquire DRAXIS Health

Jubilant Organosys Ltd., India, and DRAXIS Health Inc., Canada, have announced an agreement whereby a wholly owned subsidiary of Jubilant will acquire all the outstanding common shares of DRAXIS at a price of US\$6.00 per share in cash. The total value of this transaction is approximately US\$255 million. The proposed transaction is expected to close in the second quarter of 2008, after receipt of shareholder and court approvals.

Commenting on the acquisition, Mr. Shyam S. Bhartia, Chairman & Managing Director, and Mr. Hari S. Bhartia, Co-Chairman & Managing Director, of Jubilant said, "DRAXIS represents a unique opportunity in the North American market, offering Jubilant entry into the attractive, regulated, high-growth and high-margin radiopharmaceutical business. It also enables Jubilant to consolidate its position in the contract manufacturing business."

The arrangement agreement contains customary non-solicitation provisions, but permits DRAXIS, in certain circumstances, to terminate the arrangement and accept an unsolicited superior proposal, subject to fulfilling certain conditions. DRAXIS has agreed to pay Jubilant a break fee of US\$10.5 million in such circumstances and certain other limited circumstances if the transaction is not completed. (Source: www.biospace.com)

Novartis acquires a quarter of Alcon

In a bid to diversify its business away from traditional pharma, the Swiss drug maker Novartis has bought a 25 per cent stake in the Swiss eye care company Alcon for US\$11 billion. Novartis might purchase another 52 per cent of Alcon in 2010 for US\$28 billion more. Novartis CEO Mr. Daniel Vasella called Alcon an excellent strategic fit with Novartis and its strategy of drilling into high-growth areas of the market, "Eye care will continue to grow dynamically as there is a growing unmet medical need driven primarily by the world's aging population." (Source: www.fiercepharma.com)

China approves its first human H5N1 vaccine

The State Food and Drug Administration of China recently approved production of the country's first human vaccine for the H5N1 virus. The vaccine, developed by Beijing Sinovac and the Chinese Centre for Disease Control and Prevention is based on whole, inactivated virus particles of a H5N1 strain identified by the WHO in Viet Nam.

Like its Western counterparts, the Sinovac vaccine was approved after two phases of clinical trials, enrolling a total of 402 participants, showed its safety and ability to induce an immune response. The third phase, to test whether the vaccine prevents real infection, has not yet been carried out, as there has been no massive spread of H5N1 influenza in people. Without the Phase III clinical trial, approvals for the Sinovac vaccine and other H5N1 vaccines are currently for production only, rather than direct vaccination. (Source: www.scidev.net)

Monsanto partners with Bayer CropScience

Monsanto, the world's largest seed company, said it has entered into an exclusive partnership with rival Bayer CropScience to develop a new treatment for corn seeds. The deal is part of Monsanto's wider effort to capture more of the global corn seed market.

Monsanto is a big player in commodity crops like soybeans and cotton, and its CEO Mr. Hugh Grant told investors that increasing corn seed sales is a key part of Monsanto's plan to double its annual operating profit by 2012. The treated seeds would be resistant to a fungus and other diseases, using the patented technology of Bayer CropScience, a division of the Germany-based chemical giant Bayer AG.

While Monsanto has traditionally competed with Bayer in the market for genetically engineered seeds, the companies formed a research partnership last summer to develop new strains of biotech crops. The alliance is part of Monsanto's plan to offer strains of corn that have multiple engineered genes to make the crops resistant to pests and herbicides. (Source: www.agbios.com)

Ranbaxy and Orchid enter into strategic alliance

In India, Ranbaxy Laboratories Ltd. and Orchid Chemicals & Pharmaceuticals Ltd. have entered into a business alliance involving multiple geographies and therapies for both finished dosage formulations and active pharmaceutical ingredients. Additionally, this agreement would establish a framework for enhanced future co-operation between the two companies.

Speaking on the development, Mr. Malvinder Mohan Singh, CEO & Managing Director of Ranbaxy, said, "Orchid is a niche player in the global pharmaceutical industry with an impressive track record, particularly in sterile products." Commenting on the alliance, Mr. K. Raghavendra Rao, Managing Director of Orchid, said, "Ranbaxy's global scale and market reach and Orchid's state-of-the-art development and manufacturing capabilities would expand the business of both companies." (Source: www.biospectrumasia.com)

Biocon to form a subsidiary for R&D

India's Biotech major Biocon plans to set up a subsidiary unit for its research and development this year, contrary to the industry norm of spinning it off as a separate company. "The company doesn't want to spin off as a separate firm because the management feels that R&D is still an integral part of the company," said a source close to the development. Biocon's R&D team is working for developing products for diabetes, cardiovascular, inflammation, oncology and endocrinology. The firm has four molecules and it would be transferring all of them to the subsidiary company, the source said. (Source: economictimes.indiatimes.com)

Caliper Life Sciences allies with Horizon Discovery

Caliper Life Sciences Inc., the United States, has announced a partnership with Horizon Discovery Ltd., the United Kingdom, to expand Caliper Discovery Alliances and Services' (CDAS) oncology cell line and screening capabilities for testing single drugs and combination therapies. Through this alliance, CDAS now offers genetically defined

and isogenic human cancer cell lines that allow researchers to better identify and characterize personalized drugs targeted at a specific subset of patients.

"The alliance with Horizon Discovery adds significant value to existing CDAS offerings and illustrates Caliper's commitment to providing accurate in vitro and in vivo models for oncology research," said Mr. David Manyak, Executive Vice President of Drug Discovery Services, Caliper Life Sciences. "The addition of Horizon's isogenic cell lines to our existing oncology cell proliferation panel, and the ability to correlate results from these isogenic cell lines to efficacy in specific patient populations, further solidifies Caliper's in vitro-in vivo-human (IIH) bridge." (Source: www.genomicsproteomics.com)

Ranbaxy signs drug discovery development pact with Merck

Ranbaxy Laboratories Ltd., India, and Merck & Co. Inc., the United States, have signed a strategic product development agreement providing for a drug discovery and clinical development collaboration for new products, in the anti-infective field. The two companies will work together to develop clinically validated anti-bacterial and anti-fungal drug candidates. Ranbaxy will carry out drug discovery and clinical development through clinical trials, with Merck conducting development and commercialization of drug candidates thereafter.

The agreement is for an initial term of five years and can be extended by mutual consent. Under the terms of the agreement, Ranbaxy will be paid an undisclosed upfront sum, with the potential to receive payments totalling more than US\$100 million associated with the achievement of various research, development and regulatory approval milestones for each target included in the collaboration. Ranbaxy will also receive royalties on worldwide net sales of any products commercialized under the Agreement. Commenting on the agreement, Mr. Malvinder Mohan Singh, CEO and Managing Director of Ranbaxy, said, "We believe that our philosophy of partnering with big pharma will continue to gather momentum, as companies continue to recognize the strength and breadth of our R&D expertise and resources." (Source: www.biospace.com)

GENOMICS

Stem cell research reveals first step in human development

Researchers at Johns Hopkins Institute for Cell Engineering, the United States, have uncovered the molecular underpinnings of one of the earliest steps in human development using human embryonic stem (HES) cells. They identified a critical signal mediated by the protein BMP-4 that drives the differentiation of stem cells into what will become the placenta. The finding, they say, also highlights one aspect of human cell biology that has not been replicated in other animal model systems.

One reason for the excitement, the investigators say, is that the system can provide a research model to study very early human development, including the formation of placenta which develops from the same early embryo. The research team uncovered their find during efforts to study a rare human blood disorder caused by mutations in a gene called PIG-A. According to Dr. Linzhao Cheng, co-director of the stem cell programme at Johns Hopkins, a good model to study the disease does not exist as engineered mice without the gene either die before birth, or do not reproduce symptoms found in patients. It is virtually impossible to use anything other than HES cells to gather information of this kind

The result was the growth of two HES cell lines that lack PIG-A, and therefore do not contain any proteins known as glycosyl phosphatidylinositol (GPI) anchor proteins on the cell's surface. GPI anchor proteins attach many different types of proteins involved in cell communication to a cell's outside surface. Without certain GPI proteins, cells may not function properly. The researchers then took one more step to verify that their engineered HES cells behaved like normal stem cells.

One of the earliest steps of HES cell differentiation in normal development is the development of the trophoblast, a layer of seed cells that later develops into the placenta. This differentiation, according to Dr. Linzhao, occurs when HES cells are exposed to BMP-4 protein, either naturally or in lab. To their surprise, however, when they treated

their knockout cells with BMP-4, the cells did not become trophoblasts. Only when they added the PIG-A gene back into their cells did BMP-4 do its work and cause the cells to become trophoblasts. The researchers concluded that trophoblast differentiation depends on certain cell surface proteins to receive the BMP-4 signal. (Source: www.sciencedaily.com)

Genes involved in cancer development identified

Scientists at the University of Texas M.D. Anderson Cancer Centre, the United States, have identified chromosomal regions that launch cancer development. They documented three waves of genetic hits mainly involving genetic deletions that drive cells from normal to pre-cancerous states. The first wave leads to widespread expansion of urothelial cells that harbour genetic changes but otherwise appear normal under microscopic analysis. The second wave provides a growth advantage to cells that now have recognizable outer features of dysplasia. The third wave fully transforms the cell's appearance and features the onset of severe dysplasia or carcinoma in situ, in this case the urothelium.

By superimposing low-resolution map of genetic variation over geographic map of the organ's tissue, the scientists identified regions associated with first-wave and second-wave cells. Further analysis narrowed the chromosomal regions to portions of six chromosomes. Genetic losses from at least one of the six regions were found in 98 per cent of bladder cancer patients. In 82 per cent of the cases, two to five chromosomal regions were involved.

The team chose the 13q14 region on chromosome 13, which they knew harboured the tumour suppressor RB1, for high-resolution genetic analysis to identify candidate genes affecting RB1. This high-resolution genetic analysis pointed to the same section of the chromosome that the whole organ histological and genetic mapping had identified with expansion of abnormal cells. Two genes, ITM2B and P2RY5, in the region were found to give cells an initial minimum genetic advantage needed to grow into cancer, hence the researchers termed them forerunner genes. (Source: www.genengnews.com)

More genes implicated in Lou Gehrig's disease

Researchers have found a spate of mutations in a disease protein called TDP-43, which is implicated in two neurodegenerative disorders: amyotrophic lateral sclerosis (ALS) or Lou Gehrig's disease, and certain types of frontotemporal dementia (FTD). These mutations could potentially become candidates for drug targets.

Scientists recently found two more mutations. "Now we have a direct link between the genetics and the clinical pathology of these diseases," says Dr. Vivianna M. Van Deerlin, an assistant professor of pathology and laboratory medicine at University of Pennsylvania School of Medicine, the United States. "This solves the question of whether TDP-43 is involved in the disease itself or a just a by-product of it."

These mutations are hard evidence that TDP-43 is critical for the disease process. In some cases the accumulation of TDP-43 may initiate disease; in others, it might be a downstream player in the onset of pathology. "Put all these together and it becomes completely convincing that there are mutations in this gene that causes some forms of ALS," says Dr. Gerard D. Schellenberg, Associate Director for Research, Veterans Affairs Puget Sound Health Care System.

The research team surveyed 259 individuals with either ALS or ALS combined with FTD, and brains with pathological TDP-43 protein present. They determined the DNA sequence of the gene for TDP-43 and compared it with the normal TDP-43 sequence in people without these diseases. The team found two families in which a mutation was present and showed that the mutated gene tracked with the disease. Within the same family, all people tested who have the disease carried the mutated form of TDP-43, while it was absent in all unaffected people tested, within and outside the families. (Source: www.eurekalert.org)

Genetic cause for common heart enlargement identified

A new study has identified a gene that can cause the heart to become enlarged, greatly increasing the risk of heart attacks and heart failure. The

research reveals how a gene called osteoglycin (Ogn), which had not previously been linked with heart function, plays a key role in regulating heart growth. It suggests that the gene can behave abnormally in some people, and that this can lead to the heart becoming abnormally enlarged. The researchers – from Imperial College London, the Medical Research Council and other international institutions – hope that their findings will provide new avenues for treating people who either have an enlarged heart or are at risk of developing one. At present, enlarged hearts can only be treated by lowering blood pressure.

The study shows that Ogn regulates the growth of the heart's main pumping chamber, its left ventricle. If the left ventricle thickens, this creates a condition known as elevated left ventricular mass (LVM), a major contributing factor for common heart diseases. When the heart is enlarged it needs more oxygen and becomes stiff. This can cause shortness of breath or lead to a heart attack.

The researchers found that higher than normal levels of Ogn were associated with the heart becoming enlarged in rats, mice and humans. They first linked the Ogn gene with elevated LVM by looking at rat models and analysing how LVM related to the genetic makeup of rats with both elevated and normal LVM. They then carried out the same analyses on samples from the human heart, volunteered by patients who had undergone cardiac surgery. These analyses showed that out of 22,000 possible genes, Ogn was the gene most strongly correlated with elevated LVM in humans. (Source: www.eurekalert.org)

Newly identified gene may prompt pancreas cells formation

Researchers at Rockefeller University, the United States, have now uncovered key genetic signals involved in how the pancreas begins forming, a finding they say might lead to regenerative therapies for patients with certain forms of diabetes whose pancreases no longer function.

In both frogs and zebra fish, researchers had some understanding of the genetic signals that cause the endodermic tissue to begin developing into pancreatic tissue. They knew that the gene Gata5 is expressed at the earliest stage of endo-

derm development, and that at the initiation of organogenesis, in which the pancreas is already starting to form, the pancreatic marker gene Pdx1 is turned on. But they were missing a key step in the middle.

To find out what happens between Gata5 and Pdx1, Dr. Ali Brivanlou, head of the Laboratory of Molecular Vertebrate Embryology, and post-doctoral researcher Dr. Francesca Spagnoli used a gene microarray in frog embryos to identify 141 genes whose expression depends on Gata5 signalling. Dr. Spagnoli then independently verified these genes in other model systems, eventually eliminating all but one: TGIF2. "We found that TGIF2 was a key target of Gata5," she says. "It is expressed early in the region known to give rise to the pancreas."

To find out what role TGIF2 plays in pancreatic organogenesis, the researchers eliminated its expression in frog embryos and found that a larger liver developed, but no pancreas. They then discovered that TGIF2 controls the expression of the BMP gene, which is part of a family of proteins that play regulatory roles in growth and development. In this case, TGIF2 acts mainly by restricting BMP signalling in the endoderm to allow the formation of the pancreas. "This finding connects Gata5 to Pdx1, covering the gap of knowledge in the window of time between endoderm induction, patterning and organogenesis," Dr. Spagnoli says. (Source: www.sciencedaily.com)

Redesigned jellyfish gene helps screen for HIV drugs

A drug screening technology from Geneart AG, Germany, could aid the discovery of a new type of antiviral drug for HIV and other viruses. The cell-based assay makes use of a re-engineered jellyfish gene, which produces a fluorescent product when it successfully copies the behaviour of HIV virus. The assay will allow scientists to investigate drugs that could target one of the virus's key processes. In a human white blood cell, the virus needs to move its genetic information, in the form of messenger RNA (mRNA), from the nucleus to the cytoplasm, to produce proteins and to replicate itself. The transfer process involves different cellular and viral proteins that bind to the mRNA to move it from one part of the cell to the other.

Scientists hope that drugs which target this export mechanism could prevent the HIV virus from replicating within the human body while leaving the human pathways in healthy cells untouched. The new technique allows scientists to identify novel antiviral drugs, which for the first time would target pathways transferring genetic material.

To build a cell-based assay that focuses on the mRNA export itself, Dr. Marcus Graf and his colleagues from Geneart re-engineered a gene from the jellyfish, which is normally responsible for a fluorescent green protein, so that it would transfer its mRNA through pathways similar to those used by the HIV virus. Once the genetic material has been transferred to the cytoplasm, the information encoded in the mRNA triggers the production of the fluorescent green protein, which causes the cell to light up. However, if the pathway is blocked and the mRNA could not escape from the nucleus, the cell would not light up, and the change can be detected using optical equipment. (Source: www.labtechnologist.com)

Gene that causes kidney inflammation tagged

In the United Kingdom, Prof. Tim Aitman Cook, leading a Medical Research Council team that included Prof. Terry Cook from Imperial College London, has identified a gene that controls the activity of a group of cells thought to be responsible for potentially severe inflammation of the kidney. The gene is known as Jund, and it could offer a new pathway for tackling the autoimmune destruction of kidney tissue, which can occur in lupus patients, causing renal failure. Jund regulates the activity of macrophages, cells that help fight infection by eating up cellular debris and pathogens and stimulating immune cells. The new research demonstrated that when these cells are overactive, they can destroy healthy kidney tissue.

Prof. Aitman said, "By reducing the activity of the Jund gene, we were able to reduce activity of inflammatory cells that can become overactive in certain diseases of the kidney. Such a therapy would be of obvious benefit to patients suffering from autoimmune diseases such as lupus. This would allow them to avoid dialysis and maintain their quality of life." (Source: www.eurekalert.org)

MEDICAL BIOTECH

First diagnostic test for neurodegenerative diseases

NuroPro, a new blood test that can give an early diagnosis of neurodegenerative disease and distinguish between Parkinson's and Alzheimer's diseases, is to be launched soon. Power3 Medical Products, a proteomics company in the United States, said it would be the first diagnostic test for neurodegenerative diseases on the market. NuroPro measures 59 protein biomarkers, and their relative levels can help identify the disease as Parkinson's, Alzheimer's or Lou Gehrig's disease, or tell whether a patient is disease-free.

The test is highly accurate with a specificity and sensitivity in the high 90s, according to Mr. Steve Rash, CEO of Power3. Two clinical validation studies are currently underway at the Cleo Roberts Centre of Clinical Research in the United States and the Research Institute of Thessaly in Greece. There is currently no diagnostic test for any neurodegenerative disease on the market – diagnoses are currently based solely on a clinical diagnosis of symptoms. (Source: www.eurekalert.org)

Experts move closer to identifying best embryos

There is currently no way of telling which embryos are likely to develop into successful pregnancies from those that fail to even attach themselves in the womb. As such, couples often opt to have more than one embryo implanted to increase chances of pregnancy. But this can result in multiple pregnancies that can be dangerous to both the mother and the babies. Now, scientists in Australia appear to be moving closer to identifying genes that determine which test-tube embryos stand the best chance of implanting in the womb and growing into healthy babies.

Scientists in Australia said they may have obtained a better idea of the profile of embryos that stand a better chance of developing into healthy babies. "Now, embryos are chosen on the basis of appearance, shape and regularity," says Dr. Gayle Jones, a senior research scientist at the

Monash Immunology and Stem Cell Laboratories. "If we can increase the predictive value by just 20 per cent, it will be a massive bonus to encourage people to accepting (single) embryo transfer without a loss of pregnancy outcome."

In the study, the scientists took DNA fingerprints by removing 8 to 20 cells from embryos five days after they were fertilized. These eggs were taken from 48 women in Greece undergoing the fertility treatment in vitro fertilization. Of these, 25 women eventually became pregnant and 37 babies were born. The scientists later matched the DNA fingerprints with babies that were born and found they all contained genes that were involved in cell adhesion, cell communication, cellular metabolic processes and response to stimuli.

"We believe that it will be possible to refine our gene set to a smaller number of genes that is more highly predictive of (an embryo's) viability and ability to develop to a term pregnancy when transferred to a receptive uterus than current selection criteria," Dr. Jones said. The team aims to narrow the list of genes to just 5 to 10. (Source: www.newsdaily.com)

Promising new nanotechnology for spinal cord injury

A spinal cord injury often leads to permanent paralysis and loss of sensation below the site of the injury because the damaged nerve fibres cannot regenerate. The nerve fibres or axons have the capacity to grow again, but do not because they are blocked by scar tissue that develops around the injury. Researchers at Northwestern University (NWU), the United States, have shown that a new nano-engineered gel inhibits the formation of scar tissue at the injury site and enables the severed spinal cord fibres to regenerate.

The gel is injected as a liquid into the spinal cord and self-assembles into a scaffold that supports the new nerve fibres as they grow up and down the spinal cord, penetrating the site of the injury. When the gel was injected into mice with a spinal cord injury, after six weeks the animals had a greatly enhanced ability to use their hind legs and walk. "We can inject this without damaging the tissue. It has great potential for treating human beings," said lead author Dr. John Kessler, a

professor of stem cell biology at NWU Feinberg School of Medicine. "We designed self-assembling nanostructures – the building blocks of the gel – to promote neuron growth," said co-author Dr. Samuel I. Stupp, a professor of materials science and engineering, chemistry, and medicine.

The nano-engineered gel works in several ways to support the regeneration of spinal cord nerve fibres. Besides reducing the formation of scar tissue, it also instructs the stem cells – which would normally form scar tissue – to instead produce a helpful new cell that makes myelin. Myelin sheaths the axons of the spinal cord to permit the fast transmission of nerve impulses. The gel's scaffolding also supports the growth of the axons in two critical directions – up the spinal cord to the brain (the sensory axons) and down to the legs (the motor axons.) (Source: www.eurekalert.org)

Effective colon cancer prevention treatment discovered

Using a combination of a targeted cancer-fighting agent and a low dose of an anti-inflammatory drug, researchers at University of California Irvine (UCI), the United States, have reduced the risk of reoccurring colorectal polyps, an early sign of colon cancer, by as much as 95 per cent with fewer toxic side effects. The study marks a breakthrough in the effort to combat colon cancer, says Dr. Frank L. Meyskens Jr., the Daniel G. Aldrich Chair at UCI and director of its Chao Family Comprehensive Cancer Centre.

In earlier studies, Dr. Meyskens had established a safe and well-tolerated dose – 1/50th of what would typically be used to treat advanced cancers – of difluoromethylornithine (DFMO). The scientists combined this reduced dose of DFMO with sulindac, a non-steroidal and anti-inflammatory drug, to improve treatment and decrease the re-occurrence of potentially cancerous colon polyps with reduced toxic side-effects. They enrolled 375 patients who had a history of at least one colorectal polyp, or adenoma, within the previous five years. Patients were randomly assigned to either a combination of 500 mg of daily DFMO and 150 mg of sulindac or placebos. Patients were monitored for three years, and adenoma recurrence was measured by colonoscopy. The results were impressive.

The overall risk for recurrent adenoma was 41.1 per cent in placebo group compared with 12.3 per cent in treated patients, a 79 per cent reduction. Risk for recurrent advanced adenomas reduced to 0.7 per cent from 8.5 per cent in placebo group, a 92 per cent reduction. Similarly, risk for adenomas larger than 1 cm saw a 90 per cent reduction. The rate of reduction was so pronounced that the trial's independent data and safety monitoring board stopped the trial early. An analysis of side-effects and toxicity found no difference between the treatment and placebo groups. There also was no difference in side-effects requiring an overnight hospitalization, gastro-intestinal side effects or cardiovascular side-effects between the two groups. (Source: www.sciencedaily.com)

Tumour-sensing role for blood pressure enzyme

Researchers have found that by increasing production of a blood pressure-regulating enzyme in mice, they can enhance the ability of the mice's immune system to sense tumour growth. When scientists at Emory University School of Medicine, the United States, engineered mice that make more angiotensin-converting enzyme in white blood cells called macrophages, the mice could more effectively limit the growth of injected tumours.

The enzyme works by "trimming" small bits of protein that originate from the tumours, allowing the immune system to identify the tumours and mount a response more efficiently. Dr. Kenneth Bernstein, Emory distinguished service professor of pathology and laboratory medicine, says his group's findings suggest a strategy for amplifying immune system function in humans. Doctors might be able to enhance a cancer patient's ability to resist a tumour by removing his or her white blood cells, boosting their production of angiotensin-converting enzyme, and re-infusing them, Dr. Bernstein says.

Angiotensin-converting enzyme (ACE) plays a critical role in controlling blood pressure and is the target of common medications. The hormone angiotensin constricts blood vessels, increases the brain's perception of thirst and indirectly causes the kidneys to retain sodium, thus limiting its production can reduce blood pressure. ACE activates an inactive form of angiotensin.

To find ACE's role in the immune system, the researchers created mice with a genetic alteration in the ACE gene, forcing the gene to be turned on only in macrophages. When injected with several types of melanoma or lymphoma, the altered mice developed smaller tumours than normal mice. The tumours they did have contained more white blood cells that attack the cancerous cells. Macrophages induce the white blood cells called T cells to grow. The T cells in turn kill virally infected cells, and sometimes tumour cells as well. (Source: www.healthnewsdigest.com)

Infant rotavirus vaccine proves effective at critical age

A trial of a rotavirus vaccine in children in ten Latin American countries has shown it to be effective at the ages children are most vulnerable to rotavirus gastroenteritis. "The results are likely to be similar in other developing countries with a middle-income population and cultural background similar to these Latin American countries," said Dr. Miguel O'Ryan, one of the researchers from the University of Chile. The study enrolled more than 15,000 infants aged 6-13 weeks. Each was randomly assigned either two doses of Rotarix – an oral live attenuated rotavirus vaccine – or a placebo, at around two and four months, and followed up for two years.

Children from Argentina, Brazil, Chile, Colombia, Dominican Republic, Honduras, Mexico, Nicaragua, Panama and Venezuela were included in the trial. The vaccine is derived from the most commonly circulating strain of rotavirus. The vaccine prevented around 80 per cent of severe rotavirus gastroenteritis cases and 83 per cent of hospital admissions for the illness over the two years. Previous studies using the vaccine had shown protection during the first year of life. The vaccine also offered good protection against some other strains across the two-year period. (Source: www.scidev.net)

Cancer pathways that control the adult stem cell population

In the United Kingdom, Prof. Alan Clarke from Cardiff University School of Biosciences, together with his colleague Dr. Owen Sansom from the

University of Glasgow, has found that if a crucial gene called Apc is lost or damaged, then this normal function of controlling the adult stem cell population breaks down and ultimately leads to a tumour.

The scientists used genetic technology to manipulate intestinal stem cells and mimic the process by which a part of the intestine called the crypts is regenerated following high levels of DNA damage or injury. They found that a mechanism called Wnt signalling drives this process and it is essential to send stem cells down the route to become replacement cells in the damaged part. Normally, Wnt signalling is turned down once the stem cells have done their job. If this does not happen, then more and more cells are added to the crypt and ultimately a tumour forms. Prof. Clarke said, "Our work shows that Apc has a role in switching off Wnt signalling, controlling the adult stem cell population and preventing the formation of tumours." (Source: www.eurekalert.org)

First successful libraries of avian flu virus antibodies

An international team of research scientists from the United States and Turkey, led by Sea Lane Biotechnologies, has created the first comprehensive monoclonal antibody libraries against avian influenza (H5N1) using samples from survivors of the 2005/2006 bird flu outbreak in Turkey. These libraries hold the promise for developing a therapy that could stop a pandemic in its tracks and provide treatment to those infected, and potentially pointing the way towards a universal flu vaccine.

So far, the new antibody libraries reported in the study have yielded more than 300 unique monoclonal antibodies that are active against H5N1 antigens. From this group, the authors identified several broadly neutralizing antibodies that were effective against a number of contemporary subtypes of H5 (avian) flu. The antibodies recovered from the avian flu survivors may point to an exploitable weak spot in the virus. This offers the tantalizing possibility that a "universal" vaccine against all strains could be developed. Remarkably, three of the more than 300 antibodies catalogued have been found to neutralize both the H1 (the common seasonal flu) and H5 (avian flu) subtypes. (Source: www.bionity.com)

PROTEOMICS

Artificial cell may help produce designer proteins

An “artificial cell” capable of synthesising genes and making them into proteins has been developed by researchers in the United States. The postage stamp-sized machine offers a fast and cheap new way of making designer proteins not found in nature. It could ultimately help scientists test how individual patients will react to specific drugs. “At very small volumes in the order of tens of nanolitres, we can construct completely synthetic genes and express these genes to yield functional protein,” says Dr. David Kong of Massachusetts Institute of Technology (MIT).

The artificial cell resembles a computer chip. It is made from layers of rubber, forming a solid chip shot through with a network of tiny passages and chambers. “This rubber has lines and features that are the size we need for our microfluidic chambers, channels and valves,” says Dr. Peter Carr, who was also involved with the work.

The first part of the device synthesises the genes using enzymes to join together DNA strands from a pool of short templates. The finished genes are then copied to produce many versions of the final product. Cycles of heating and cooling control the enzymes carrying out the reactions. Once the genes have been made, a series of tiny pumps mixes them with the enzymes and cell extracts needed to make proteins. First, a set of enzymes must convert the DNA of the genes into RNA. This RNA is then mixed with extracts from bacterial cells containing amino acids and ribosomes, the cell structures that “read” RNA and assemble the amino acids into finished protein. In test runs, the artificial cell was used to make a fluorescent protein from jellyfish. (Source: technology.newscientist.com)

Protein helps predict prostate cancer survival

A researcher from Oregon Health and Science University (OHSU) Cancer Institute, the United States, has identified a protein that is a strong indicator of survival for men with advanced pro-

state cancer. The C-reactive protein (CRP) is a special type of protein produced by the liver and is elevated in the presence of inflammation. “This could mean that a simple blood test that is already available could help in clinical decision making,” stated Dr. Tomasz Beer, director of the Prostate Cancer Research Programme at OHSU’s Cancer Institute.

Past research has shown that cancer causes an inflammatory response. This research also suggests that inflammation may play an important role in driving prostate cancer progression and its resistance to therapy. Inflammatory cells are attracted to cancer sites and this local inflammation can lead to a release of inflammatory markers, like CRP. Higher CRP means shorter survival and a lower probability of response to chemotherapy, according to the findings of a large Phase 2 clinical trial that evaluated treatment with docetaxel and DN-101, a high dose formulation of calcitriol or docetaxel with placebo. (Source: www.medicalnewstoday.com)

Protein factor in muscle disease of older adults

Researchers at the Burnham Institute for Medical Research, the United States, have discovered a new player in the development of a disorder called “sporadic inclusion body myositis (sIBM)”, a muscle disease that gradually weakens and wastes away in predominantly older men. The affliction is the most common muscle disease among those over the age of 50, and often under-diagnosed.

In muscles, proteins are continuously made and broken down by endoplasmic reticulum (ER), a “protein factory” in the cell. To ensure that proteins produced pass quality control, a set of ER-based inspectors identifies and removes those proteins that are not properly folded. Ubiquitin ligase RING Finger Protein 5 (RNF5) acts like one of these inspectors at the end of the assembly line by tagging defective protein products so that they can be recycled. Burnham scientists found RNF5 playing a key role in the progression of sIBM. As there is no standard treatment for sIBM, this finding offers a new understanding for the mechanism underlying development of sIBM and points to possible use of new markers for diagnosis and mouse models to test for novel therapeutics.

Following this discovery, the team led by Dr. Ze'ev Ronai developed three mouse models: one knockout model in which the RNF5 gene was missing, and two in which cells could be triggered to overproduce RNF5, with expression either limited to skeletal muscle, or within muscle and a variety of other organs. A comparison of normal and knockout mice exposed to muscle-damaging toxin showed slower healing in the knockouts, as compared with the normal mice, demonstrating the importance of RNF5 in muscle repair.

Pathologic changes within muscles of the transgenic models with RNF5 overexpression were similar to those found in muscle biopsies from patients with sIBM. RNF5 overproduction caused rapid and significant muscle degeneration, weight loss and muscle weakness, followed by extensive muscle regeneration similar to what is often seen in patients with sIBM. Muscle specimens from RNF5 overexpressing animals revealed the presence of structures known as rimmed vacuoles and congophilic inclusions, hallmarks of this disease. (Source: www.burnham.org)

Protein target in breast cancer therapy

Like mortar between bricks in a wall, T-cadherin is a protein that helps cells stick together and collectively form tissues. Cancer cells that loosen their adhesive tissue bonds stop producing T-cadherin, and in tumours, only the blood vessels that supply oxygen and nutrients express this protein. Researchers at the Burnham Institute for Medical Research, the United States, have found the link between T-cadherin and the formation and development of blood vessels that feed breast tumours. Dr. Barbara Ranscht and Dr. Robert Oshima led a team that developed the first living model to study this protein's effect on tumour angiogenesis by creating a strain of mice that develops spontaneous mammary gland tumours in the absence of T-cadherin.

The tumour model developed shows that the absence of T-cadherin delays tumour growth by an average of 10 days, decreases tumour size, and apoptosis markers are six times higher. The knockouts that have tumour live an average of 18.5 days longer than their wild-type counterparts, which translates into about 18 months of human life span.

The normal models in the study developed solid adenocarcinoma breast tumours, whereas the knockouts formed poorly differentiated breast tumours with much fewer blood vessels. When the adenocarcinoma tumours were transplanted into normal and T-cadherin-deficient mammary glands, the knockouts were deficient in growing new blood vessels. Without T-cadherin-mediated vascularization, breast cancer cells consistently metastasized to the lungs. In the control mice, on the contrary, the tumours were highly vascularized.

Stunting blood vessel growth restricts tumours and prolongs survival – a strategy behind anti-angiogenesis cancer drugs – so these results were somewhat expected, says Dr. Ranscht. “But what surprised us,” she adds, “was that even though our models survived longer, their tumour pathology worsened.” The reasons for this are not clear: loose connections between vascular cells may make it easier for tumour cells to break off and enter the blood stream, or low blood flow and oxygen levels in the tumour environment may cause free radicals to build up, spurring further mutations and malignancy. (Source: www.sciencedaily.com)

Protein that protects malaria parasite during infection

In the United States, a group of researchers have characterized haeme detoxification protein (HDP), which is encoded in the malaria genome, and demonstrated that it plays a role in protecting the *Plasmodium* parasite. During infection large quantities of haeme is released. Free haeme is very damaging, and to protect itself from this toxic onslaught, *Plasmodium* rapidly converts haeme into a crystalline material known as haemozoin.

The scientists – from Virginia Tech, the Washington University School of Medicine, the National Institutes Health and the Food and Drug Administration – showed that HDP is not only capable of rapidly converting haeme into haemozoin, its non-toxic counterpart, but it is also highly conserved in all the species of the parasite. They also established the trafficking route by which the HDP is transported out of *Plasmodium* and into the red blood cell before it subsequently returns to the parasite food vacuole where haemozoin is synthesized. (Source: www.genengnews.com)

AGRI BIOTECH

GM potatoes do not affect microflora in the soil

Potato plants with modified genes combating pathogens could be key to sustainability in agriculture. However, genes coding for resistance against a broad spectrum of pathogens could possibly have unintentional effects on the soil microflora. Research performed at Wageningen University and Research Centre (WUR), the Netherlands, has found that potato plants containing a gene coding for the T4-lysozyme via genetic modification have no unintentional effects on the composition of microflora in the soil near the roots or inside plants.

WUR research showed by means of molecular fingerprinting that the growth stage of potato plants had the greatest impact on microflora in the soil surrounding the roots (the rhizosphere) and inside the plants (the endosphere). Plants equipped with the gene coding for T4-lysozyme produce a protein in their roots which intentionally will protect the plants from bacterial and fungal attack. "You could say that by choosing the T4-lysozyme modified potato line as model one could expect the highest chance on unintentional effects," says WUR scientist Dr. Leo van Overbeek. However, the gene did not have any observable impact on the microflora. (Source: www.bionity.com)

Boost for 'green plastics' from plants

Australian researchers are a step closer to turning plants into 'biofactories' capable of producing oils, which can be used to replace petrochemicals in the manufacture a range of products. Scientists working within the joint CSIRO/Grains Research and Development Corporation Crop Biofactories Initiative (CBI) have achieved a major advance by accumulating 30 per cent of an unusual fatty acid (UFA) in the model plant, *Arabidopsis*.

UFAs are usually sourced from petrochemicals to produce plastics, paints and cosmetics. CBI is developing new technologies for making a range of UFAs in oilseeds. The production of biofactory plants can be matched to demand and will pro-

vide farmers with new, high-value crops bred to suit their growing conditions. The technology is sustainable, low on greenhouse gas generation, and can reinvigorate agribusiness. (Source: www.sciencedaily.com)

PCR-based rapid diagnostic kits for GM crops

In India, under a collaborative research project, the National Bureau of Plant Genetic Resources (NBPGR) has developed diagnostic kits based on polymerase chain reaction (PCR) for five GM crops. Bt cotton (Bollgard I) with cry1Ac gene, and Bt cotton (Bollgard II) with cry1Ac and cry2Ab for insect resistance have been commercialized in India. The other four crops are Bt brinjal and Bt cauliflower with cry1Ac gene for insect resistance, GM mustard with barnase/barstar gene for male sterility, and GM tomato with osmotin gene for drought and salinity tolerance. These food crops are either in field trials or in advanced stages of testing in contained field trials.

The kits can detect specific transgenes, cry1Ac, cry2Ab, barnase/barstar and osmotin gene, individually as well as along with CaMV35S promoter and endogenous genes, Sad1 in cotton, SRK1 in cauliflower, HMG in mustard, Lat52 in tomato. The diagnostic kits are reliable, sensitive and efficient, as more than one target sequences can be detected in a single assay, the sensitivity of the kits is up to 0.1 per cent. They are user-friendly and would require only 4 hours to complete the assay from the DNA and 8-10 hours from the plant tissue. The cost per assay will range from US\$1.25 to US\$1.50. (Source: www.seedquest.com)

Scientists sequence GM papaya genome

A group of researchers led by Dr. Wang Lei at Nankai University, China, and Dr. Ray Ming from University of Illinois at Urbana-Champaign, the United States, have sequenced the genome of a genetically modified (GM) papaya. As the first GM virus-resistant fruit tree to be sequenced, the researchers hope it will further the understanding of GM genomes and the effects of inserted genes, which could benefit both cultivation of the fruit and the understanding of fruit tree genomics.

The researchers, from 22 institutions in China and the United States, sequenced over 90 per cent of papaya's genome. They found that it has significantly fewer genes than other sequenced flowering plants, and that the plant has not experienced major genetic change across its genome in the last 72 million years. When compared with other flowering plants, they also found genetic changes associated with enhanced fruit production, adaptation to tropical day lengths and attracting seed dispersal agents. The 'SunUp' papaya used by the scientists contains randomly inserted genes to give it immunity to the papaya ringspot virus. The draft genome sequence has been added to the GenBank database and is freely available to researchers worldwide. (Source: www.scidev.net)

Tomato stands firm in the face of fungus

In agriculture, the most environmentally friendly way to combat the evolutionary change in plant diseases is to make use of the innate immune system of plants through crossing genetic traits. Now, scientists at the University of Amsterdam, the Netherlands, have discovered a molecular way to prevent tomatoes from wilting.

Dr. Martijn Rep and his team explored the molecular basis of this previously established concept of crossing in resistance genes. They considered the interaction between *Fusarium oxysporum*, a fungal pathogen, and the tomato plant in which the fungus causes wilt disease. The group found that a small protein secreted by some strains of the fungus causes it to overcome two of the tomato's disease-resistance genes. However, a third resistance gene was shown to specifically target this suppressor protein, rendering the plant totally immune to any fungal strain that produces the protein. The research thus offers a new strategy for durable disease control based on resistance gene combinations. (Source: www.sciencedaily.com)

Gene for yield, height in rice identified

Scientists in China have identified a single gene that appears to control rice yield, as well as its height and flowering time, taking what may be a crucial step in global efforts to increase crop pro-

ductivity. They were able to pinpoint a single gene, *Ghd7*, which appears to determine all three traits.

Previous studies identified a region on chromosome 7 which seemed to be responsible, but they were not able to zero in on any specific gene. "Our study shows that a single gene can control several traits with major effects. It can double the yield, and determine flowering time and plant height," said Dr. Zhang Qifa of the Huazhong Agricultural University in Wuhan province. Dr. Zhang and his colleagues studied 19 rice varieties in Asia and found that plants that were shorter, had fewer grains per cluster of flowers, and flowered earlier were lacking in the gene *Ghd7*. When the gene was restored, they noticed sharp changes of increased yields, a doubling of the time to flowering and a 67 per cent increase in height.

They also found five different versions of *Ghd7*. Highly active versions were present in warmer regions, to fully exploit light and temperature by delaying flowering and increasing yield, and less active or inactive versions were found in cooler regions, allowing cultivation in areas with shorter growing season. (Source: www.newsdaily.com)

Salt-tolerant gene found in simple plant

The cellular mechanism that controls salt tolerance has been found in the *Arabidopsis* plant by a scientist from Texas AgriLife Research, the United States, in collaboration with an international team.

Complex-N-glycan, a carbohydrate associated with a protein in plant cells, was previously thought to have no helpful function for plant growth and to cause certain allergies in humans, according to Dr. Hisashi Koiwa, lead author of the study. "This gene has been considered non-essential or even a nuisance," Dr. Koiwa said. However, the team discovered that this carbohydrate may, in fact, be responsible for a plant's ability to tolerate salt water.

The researchers applied salt to the growing plants and then examined sick plants, or those that appeared salt-sensitive. Dr. Koiwa said the finding may help plant breeders look for this gene as they cross plants in order to develop varieties less affected by salt. (Source: www.sciencedaily.com)

RECENT PUBLICATIONS

Stem Cells: From Hydra to Man

This publication illustrates that there is more than human and mouse stem cells to learn from. Reflecting the enormous growth in the knowledge of stem cells in various organisms, the book presents the conceptual language and the nature of questions, as well as a summary of the advances in our understanding of stem cells from a comparative point of view that has resulted from the development of new technology and the development of novel model organisms over the past few decades. As such, this book is largely a horizon analysis of a frontier rather than a retrospective. It presents an integrated approach to animal stem cells and covers the major contributions, tools and trends in a newly emerging field: comparative stem cell biology.

Contact: Springer, Order Department, P.O. Box 2485, Secaucus, NJ 07096-2485, United States of America. Fax: +1 (201) 348 4505; E-mail: orders-ny@springer.com.

Principles of Gene Manipulation and Genomics

Now in its eighth edition, this book provides an integrated coverage of the techniques used for gene manipulation, genomics and its related disciplines. The text covers the basic gene manipulation techniques and then describes recent developments in recombinant DNA technology, genome analysis, functional genomics, and proteomics, bringing these themes together in a final section that discusses how the techniques are applied in the real world. The edition is an accessible and up-to-date guide to this exciting field, and is the essential reference for undergraduate and graduate students of genetics, genomics, molecular biology, as well as recombinant DNA technology.

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TECH EVENTS

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E-mail: cpt2008@nrc-cnrc.gc.ca;
Website: www.cpt2008.org.

28-30 Aug
Indore
India

International Conference on Cellular and Molecular Biology

Contact: Prof. Anil Kumar, Head (Chair), School of Biotechnology, Devi Ahilya University, Khandwa road, Indore 452001, India.

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2-4 Sep
Singapore

Asia Antibody Congress 2008

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15-17 Sep
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