News in brief

Targets and mechanisms

Chip analysis of proteins

The first microchip that can analyze virtually all yeast proteins has been created by Yale University (New Haven, CT, USA) researchers[1]. The new protein chip holds the promise of increased understanding of the function of proteins, from yeast through to humans. Michael Snyder, Professor and Chair of the Yale University Department of Molecular, Cellular and Developmental Biology, says 'Most development occurs through the interaction of proteins. Diseases can arise when proteins do not interact properly. This technology allows us to get at the function of many of the different proteins far faster than current methods. This is opening up whole new areas that have never been approached before.'

Development of the chip was based on knowledge of all 6200 genes that make up a yeast cell. Until now, studying the interactions of all the proteins within a cell was not possible. The scientists at Yale cloned and purified 5800 gene products, which were printed onto slides to form a yeast proteome microarray, then screened for their interaction with other proteins and phospholipids. This was achieved by using laser scanning equipment and computer analysis to investigate proteins tagged with fluorophores. This technology could also be applied to studies of the human proteome. Yale University has licensed the technology behind the protein chip to a recently established biotech company, Protometrix (Guildford, CT, USA). Snyder, who is a scientific advisor to the new company said, 'We anticipate that the technology will become widespread within the academic community and will prove to be a valuable tool for the pharmaceutical and other industries.'

1 Zhu, H. *et al.* (2001) Global analysis of protein activities using proteome chips. *Science* 293, 2101–2105

Pathogen-specific gene responses

A pathogen-specific gene response has been identified in human immune cells by scientists at the Whitehead Institute for Biomedical Research (Cambridge, MA, USA)[2]. The immune cells, known as dendritic cells, are able to initiate an immune response for specific infectious organisms, from bacteria to fungi to viruses.

The researchers used oligonucleotide microarrays to measure gene expression profiles of dendritic cells in response to *Escherichia coli*, *Candida albicans* and the influenza virus. A shared core-response was observed, as well as pathogen-specific gene expression upon exposure to the organisms.

Nir Hacohen, a Fellow at Whitehead, said: 'The knowledge that dendritic cells are able to sense and respond specifically to each pathogen could ultimately help clinical scientists detect the presence of particular pathogens, and measure the nature of the immune response by looking for signatures of pathogen-specific genes described in this study.'

Dendritic cells, upon detection of an infectious agent, reach maturity, capture the agent and present it to T cells, thus initiating a cascade of infection-fighting immune events. Hacohen says, 'What we've discovered is that dendritic cell maturation – as a result of its recognition of a pathogen – is highly specialized… pathogens have taught us an important and useful lesson: it is possible to program particular immune responses through the activation of dendritic cells.'

'This information could eventually lead to the development of therapeutics for the optimal elimination of every type of human pathogen,' says Hacohen.

2 Huang, Q. *et al.* (2001) The plasticity of dendritic cell responses to pathogens and their components. *Science* 294, 870–875

Amoebic attraction

The movement of single molecules has been imaged in live organisms[3]. Researchers at Johns Hopkins University (Baltimore, MD, USA) have studied the amoebas' attraction for cAMP, in the hope that this could explain the directed movement of human cells in normal circumstances, and also in diseases such as arthritis, asthma, multiple sclerosis and cancer.

Peter Devreotes, from the Johns Hopkins University, says 'We can see single molecules binding to receptors and actually watch the receptors move…until now no one has seen the process one event at a time.'

Copies of the cAMP receptors are present throughout the outer membrane of the amoeba, enabling the cell to detect different levels of cAMP in its surroundings. The researchers tagged single cAMP molecules with a fluorescent dye and obtained images of glowing spots on live amoebas. The spots, which consist of single cAMP molecules bound to a receptor, then move within the cell membrane. Receptors at the 'front' of the cells had faster and more frequent interactions with cAMP. These observations illustrate the dynamic properties of receptors and suggest that they could be polarized in chemotactic cells.

3 Ueda, M. *et al.* (2001) Single-molecule analysis of chemotactic signaling in *Dictyostelium* cells. *Science* 294, 864–867

Superbugs no match for oregano

Oil from the common herb, oregano, has been shown to reduce infection by drug-resistant bacteria as effectively as traditional antibiotics. At Georgetown University Medical Center (Washigton, DC, USA), a team of researchers collaborating with North American Herb and Spice Company (Fort Pierce, FL, USA) has tested both whole oregano oil and an isolated major component of the oil, carvarol, both *in vitro* and *in vivo* against drug-resistant *Staphylococcus*.

In their *in vitro* studies, the group compared the antibiotic effects of oregano oil with the standard antibiotics streptomycin, penicillin and vancomycin. At relatively low doses, oregano oil was found to inhibit *Staphylococcus* growth to the same extent as the antibiotics. Furthermore, studies in mice showed that oregano oil was as effective as vancomycin and more effective than carvarol at inhibiting the *Staphylococcus* infection, which suggests that oregano contains more than one antibacterial component.

Harry G. Preuss from Georgetown University believes that these preliminary findings, presented at the *42nd Annual Meeting of the American College of Nutrition* (4–7 October 2001, Orlando, FL, USA), warrant further investigation.

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Secrets of ion channel selectivity revealed

Scientists have visualized the structure of the selectivity filter within a potassium channel that enables it to identify different ions and adapt to variations in potassium concentration[4,5].

The ion channel gate is separated from the intracellular environment by a selectivity filter, which can be exposed to extremes of potassium concentrations depending on whether the gate is open or closed. Roderick MacKinnon and colleagues at the Howard Hughes Medical Institute (New York, NY, USA) wanted to determine how the structure of the filter enables it to adapt to these variations. The group cloned a K^+ channel complexed to the Fab fragment of an antibody raised against the tetrameric form of the channel. The structure of this complex was then elucidated by X-ray crystallography at 2 Å resolution, which revealed the organization of water molecules within the channel.

The researchers found that the central cavity of the ion channel holds a K^+ ion surrounded by eight water molecules, which results from a geometric and chemical match between the cavity and the K^+ hydration complex. The ion is passed into the selectivity filter by a specific arrangement of carbonyl oxygen atoms that protrude into the extracellular solution, accompanied by the removal of the hydration shell of the K^+ ion. The selectivity filter was found to exist in two conformations driven by the K^+ concentration it is exposed to. At low K^+ concentration, the filter loses one of its dehydrated K^+ ions and undergoes a conformational change that renders it non-conductive. At high K^+ concentrations, the filter adopts a different conformation that allows ion conduction.

This is the most detailed structural visualization of an ion channel, to date, and should help researchers to understand abnormalities in ion channel function, such as in prolonged QT syndrome, which is caused by changes in the conduction rate of potassium ion channels.

4 Morais-Cabral, J.H. *et al.* (2001) Energetic optimization of ion conduction rate by the K^+ selectivity filter. *Nature* 414, 37–42

5 Zhou, Y. *et al.* (2001) Chemistry of ion coordination and hydration revealed by a K^+ channel–Fab complex at 2.0 Å resolution. *Nature* 414, 43–48

Genomic data-diving

has been successfully completed by the University of Delaware (Newark, NJ, USA). During their 17-day *Extreme 2001* research trip, scientists sequenced almost two million base-pairs of DNA, enough to comprise a small bacterial genome.

Using the research vessel *Atlantis* and the submersible *Alvin*, the group has been studying the genomes of organisms that live in hydrothermal vents almost two miles deep in the Pacific Ocean. The Pompeii worm (*Alvinella pompejana*), vent crabs and bacteria are among the organisms studied that could provide new products (e.g. biopharmaceuticals and pressure-resistant enzymes for food processing) or applications, such as hazardous waste clean-up.

In addition to their daily dives, the group is conducting round-the-clock laboratory analysis so that samples are analyzed on the research vessel as soon as they have been collected by the submersible. Craig Cary, the marine biologist who leads the team, said, 'The research we are doing this year will allow us to better understand the amazing ecosystem that exists in these vents and how these organisms, which thrive under some of the harshest conditions on Earth, interact with each other.'

The research trips also form part of virtual field trips for students from the USA, Australia, Canada, Guam, New Zealand and Puerto Rico, as part of an ongoing educational outreach program. Students and the public can see photos, video clips and daily updates about the expedition at http://www.ocean.udel.edu/extreme2001.

Taking steps towards walking

The areas of the brain that control movement and walking have been found to remain active in paralyzed individuals suffering from a spinal cord injury. The results of the recent study, published in *Nature*[6], hold promise for new technologies that could bypass damaged motor pathways, enabling movement to be restored.

It was thought that the brains of individuals paralyzed by a spinal injury might not retain the ability to send signals to muscles. The reasoning was that when portions of the brain are not used, they often undergo a certain amount of reorganization. However, the new results prove this theory wrong.

The study used magnetic resonance imaging (MRI) to study brain activity in individuals with spinal cord injury compared with a healthy control group. The MRI scans showed increased electrical activity in each corresponding part of the brain when the patients were asked to move certain parts of their body. Five uninjured individuals were also imaged when asked for the same movements, which confirmed the regions of the brain responsible for the movement of certain parts of the body.

Hopes for intervention are centered around an electrode, which would be implanted to read brain signals. The next step would be to implant a second electrode just outside the spinal cord, which would receive command signals from electrodes in the brain and relay them to the appropriate muscle. However, even if this were to work, the brain would then need to receive some sort of sensory feedback from the muscle to properly refine the movements. Other electrodes would, therefore, have to be implanted in the sensory cortex to carry information back to the brain.

6 Shoham, S. *et al.* (2001) Motor-cortical activity in tetraplegics. *Nature* 413, 793

Oestrogen receptor lowers blood pressure

An oestrogen receptor has been found to regulate blood pressure and flow in the brain[7]. The oestrogen ERα receptor could be a potential therapeutic target for the treatment of stroke and other injuries to the brain caused by high blood pressure. The results could also explain why more women experience stroke in the later years of their life, after menopause.

The ERα receptor appears to regulate the activity of certain genes, affecting their ability to produce nitric oxide and other vasodilators. The study found that mice

treated with oestrogen for one month showed elevated levels of nitric oxide synthase and cyclooxygenase-1 – enzymes that are responsible for manufacturing the vasodilators nitric oxide and prostacyclin, respectively. Mice that were bred without the ERα receptor were less able to dilate blood vessels when treated with oestrogen, confirming the role of the oestrogen receptor in blood vessels in the brain. The study also found that the receptor is located in the endothelium of blood vessels, which is where it controls the manufacture of the enzymes that dilate the vessels.

Blood pressure is a major risk in stroke and other cardiovascular disease. As well as leading to new treatments for stroke and other vascular disorders in the brain, future research could lead to an understanding of how blood pressure is regulated in other parts of the body.

7 Geary, G. *et al.* (2001) Cerebrovascular NOS and cyclooxygenase are unaffected by estrogen in mice lacking estrogen receptor-α. *J. Appl. Physiol.* 91, 2391–2399

Disappointing results for oestrogen-replacement therapy

Oestrogen replacement therapy does not prevent secondary occurrence of cerebrovascular disease. Recent results contradict previous observational studies that oestrogen hormone replacement therapy could protect post-menopausal women from the risk of a second stroke or transient ischemic attack (TIA)[8].

The Women's Estrogen for Stroke Trial (WEST) was the first randomized, controlled clinical trial of oestrogen therapy for secondary prevention of cerebrovascular disease, including stroke and TIA. The trial was conducted in postmenopausal women who had recently suffered an ischemic stroke or TIA. However, it was found that oestrogen therapy did not reduce mortality or the recurrence of stroke in postmenopausal women with cerebrovascular disease. The report concluded that the therapy should not be prescribed for this secondary prevention.

Every year, stroke kills twice as many women than breast cancer, highlighting its position as an under-recognized public health issue. Researchers hope that the results of the trial are the first in a series that will enable researchers to understand the relationship between hormone therapy and vascular disease.

8 Viscoli, C.M. *et al.* (2001) A clinical trial of estrogen-replacement therapy after ischemic stroke. *New Engl. J. Med.* 345, 1243–1249

Antioxidants show promise in neurodegenerative disease

Neurodegenerative diseases such as Parkinson's and Alzheimer's could be treated with synthetic antioxidants[9]. The synthetic compounds could work by attenuating the effects of oxidative stress in the mitochondria. Mitochondria use oxygen and nutrients to generate energy that is crucial for cellular function. However, as a byproduct, they also produce potentially damaging reactive oxygen species. The mitochondria's own antioxidant defenses are, therefore, paramount.

Previous studies in mice that lack the natural antioxidant, superoxide dismutase 2 (SOD2), show oxidative damage to the mitochondria, which has been implicated in many neurological diseases. These recent studies treated mice lacking SOD2 with three different synthetic scavengers of reactive oxygen species (SCSs). The SCSs used were proprietary compounds developed by Eukarion (Bedford, MA, USA) who collaborated in the study with the Buck Institute for Age Research (Novato, CA, USA). The compounds mimic naturally occurring SCSs and catalases.

The study showed that each of the SCSs dramatically enhanced survival in mice by more than three-fold that of untreated mice. The treatment was also shown to rescue spongiform neurodegenerative disorder, showing that the SCSs could cross the blood–brain barrier, thereby gaining access to the mitochondria where the oxidative stress occurs.

'These studies are important and relevant to human disease,' said Simon Melov, a founding faculty member of the Buck Institute. 'They clearly demonstrate, in a mammalian system, the link between the build-up of mitochondrial oxidative stress and the development of severe neurodegeneration with potential relevance to several age-related degenerative disorders.'

The group is now working towards the clinical development of one of the SCSs, EUK189, for the treatment of a potentially broad range of degenerative age-related conditions.

9 Melov, S. *et al.* (2001) Lifespan extension and rescue of spongiform encephalopathy in superoxide dismutase 2 nullizygous mice treated with dismutase–catalase mimetics. *J. Neurosci.* 21, 8348–8353

Genetic changes identified in bacterial biofilms

Researchers have identified some of the key genes involved in antibiotic resistance in bacterial biofilms[10]. The results could lead to new antibiotics that target specific genes and could be used to treat individuals with biofilm infections such as *Pseudomonas aeruginosa* infections in cystic fibrosis.

The *P. aeruginosa* genome was recently sequenced and is known to contain around 5500 genes. The researchers used a microarray of the complete genome to identify gene expression in bacterial biofilms compared with bacteria that grow freely (planktonic).

Although researchers first thought that there would be hundreds of genetic differences between the two forms of the bacteria, they were surprised to find only 73 significant differences. This subset of genes was found to behave differently in the biofilm bacteria compared with the planktonic bacteria.

Among the most important identifications was the *rpoS* gene, whose expression was decreased in biofilms, which made the bacteria grow thicker and faster. This could delay antibiotics from penetrating the biofilm and thereby provide cells deeper in the layer with time to respond to the antibiotic.

They also found that 20 genes within the biofilm changed their activation pattern when treated with the antibiotic tobramycin, compared with non-treated biofilms. These genes could be particularly important for potential resistance candidates.

10 Whiteley, M. *et al.* (2001) Gene expression in *Pseudomonas aeruginosa* biofilms. *Nature* 413, 860–864

No-nonsense Noni

The medicinal properties of the Noni tree (*Morinda citrifolia*) have been harnessed in flash-frozen, freeze-dried capsules by American Nutraceuticals (Sarasota, FL, USA). The fruit of the tree, found in tropical regions of the South Pacific, has

been used for centuries to treat infections, clear the lungs, regulate menstruation and lower blood pressure. However, Noni juice has an offensive taste and odour and so is often mixed with other fruits to make it more palatable.

Scientists at Pettersson and Associates Consulting Chemists (Atlanta, GA, USA) and Vanguard Scientific (Kirkland, WA, USA) studied 13 different Noni extracts on the market and tested the number of active substances and the actual compositions of the samples. The flash-frozen formulation was found to be almost 2000% more active than the leading brand of liquid extract and 267% more active than the closest dried brand[11]. It is thought that the immunostimulatory properties of Noni extract could be beneficial as part of treatments for cancer, AIDS, and chronic and acute infections.

11 Kaltsas, H. (2001) Noni: from legend to promising nutraceutical. *Alt. Med.* Jan, 36

Cancer targets and mechanisms

Tumour angiogenesis cells identified

Scientists at the Memorial Sloan-Kettering Cancer Center (New York, NY, USA) and the Weill Medical College of Cornell University (New York, NY, USA) have identified the cells that are necessary for tumour angiogenesis[12]. Although it had previously been known that tumours recruit cells to form new blood vessels, the origin of such cells was not understood. This study has elucidated the mobilization of precursor cell lines from bone marrow, which are recruited by vascular endothelial growth factor (VEGF) stem cells to the tumour blood vessels. This research has also highlighted the importance of blocking both the VEGF-receptors 1 and 2 in the inhibition of tumour formation.

Shahin Raffi, a Weill Medical College vascular haematologist-oncologist, said: 'This is the first definitive proof that bone marrow contributes to the formation of functional blood vessels of certain tumours. It increases our understanding of the mechanism by which antiangiogenic agents block tumour growth, generating new targets for cancer therapy.'

The researchers used angiogenic-defective, tumour-resistant mice, which are deficient in two proteins, Id-1 and Id-3. They showed that transplantation of wildtype bone marrow or VEGF-mobilized stem cells into Id-mutant mice restored tumour angiogenesis and growth. Robert Benezra, a laboratory head in the Cell Biology Program at Memorial said, 'This study provides further indication of the importance of the *Id* genes in cancer development. They are detected in both cancer cells and mobilized circulating endothelial cells. Presence of these circulating cells is a potential marker for early cancer detection.'

David Lyden, first author of the study and a paediatric oncologist at Memorial, said 'We hope to be able to apply our findings to cancer patients for diagnostic purposes and for treatment, and are beginning studies to determine the diagnostic potential.' He continued, 'There are monoclonal antibodies…that can recognize and block metabolized blood cells, preventing tumour growth and metastasis. These are also being studied as possible treatment options.' These findings suggest new targets for cancer therapies and a possible diagnostic blood test for cancer.

12 Lyden, D. *et al.* (2001) Impaired recruitment of bone-marrow-derived endothelial and hematopoietic precursor cells blocks tumor angiogenesis and growth. *Nat. Med.* 7, 1194–1201

Cancer eradication strategy

Researchers at Yale University (New Haven, CT, USA) have developed a new molecule to eradicate cancer by targeting tumour blood vessels[13]. This new molecule has been designated 'icon' (for immunoconjugate) and targets tumour blood vessels for destruction by the immune system, without harming normal tissue vessels.

The scientists inserted the gene for the icon into an adenovirus vector, which was subsequently injected into the tumours. The result was infection of the tumour cells with the icon molecules, which were then released into the mouse bloodstream. To target the tumour specifically, a molecule that is expressed solely on the inner surface of the tumour is required; the molecule used here is tissue factor, which is involved in blood clotting and binds Factor VII in a strong and specific interaction. The icon molecule was constructed in two parts: one part targets the icon to tissue factor and the other part is the region of a natural antibody that activates an immune system attack against any molecules that bind to icon.

Principal investigator Alan Garen, Professor of Molecular Biophysics and Biochemistry at Yale says, 'Our study resulted in the eradication of injected tumours and also of other tumours in mice that had not been injected. This serves as a model of metastatic cancer. None of the normal tissues in the mouse appeared to be harmed by our procedure.' He continued, 'The result is that the tumour blood vessels are destroyed by the immune system and consequently the tumour cells die because they lack a blood supply. The normal blood vessels survive because they do not express tissue factor and, therefore, do not bind the icon.'

13 Hu, Z. and Garen, A. (2001) Targeting tissue factor on tumor vascular endothelial cells and tumor cells for immunotherapy in mouse models of prostatic cancer. *Proc. Natl. Acad. Sci. U. S. A.* 98, 12180–12185

Black raspberries are fruitful against cancer

Lyophilized black raspberries (LBRs) inhibit both the initiation and promotion stages of carcinogenesis in a mouse model of oesophageal cancer[14]. In a study at Ohio State University (Columbus, OH, USA), scientists evaluated the inhibitory potential of the fruits by carrying out several anti-initiation studies in mice with *N*-nitrosomethylbenzylamine (NMBA)-induced oesophageal cancer.

In a NMBA metabolism study, a diet of 5% or 10% LBRs for two weeks before NMBA treatment (0.25 mg kg^{-1}) and throughout a 30-week tumorigenicity bioassay, resulted in reduced tumour multiplicity by 39% and 49%, respectively. The formation of promutagenic *O*(6)-methylguanine DNA adducts after a single dose of NMBA in a short-term bioassay was also inhibited by 73% and 80% after feeding with 5% and 10% LBRs, respectively. Furthermore, feeding 5% LBRs inhibited adduct formation by 64% at a higher dose of NMBA (0.5 mg kg^{-1}).

The inhibition of tumour progression was studied in mice given 0.25 mg kg^{-1} NMBA three times a week for five weeks, after which feeding with either 5% or 10% LBRs began. LBRs caused a significant reduction in the formation of preneoplastic oesophageal lesions, decreased tumour incidence and multiplicity, and reduced cellular proliferation.

Oesophageal cancer is the sixth-leading cause of cancer-related deaths worldwide, and has a poor prognosis with five-year survival rates of 8–12%. Gary Stoner, co-author of the study, has also studied the anti-cancer properties of strawberries, and suggests that eating fresh berries as one of the 4–6 recommended daily portions of fresh fruit and vegetables could be beneficial in preventing cancer.

14 Kresty, L.A. *et al.* (2001) Chemoprevention of esophageal tumorigenesis by dietary administration of lyophilized black raspberries. *Cancer Res.* 61, 6112–6119

Old drug, new therapy?

Researchers at the Ohio State University (Columbus, OH, USA) have discovered that combining standard chemotherapy with suramin (a drug that has been used in the past to treat parasitic infections) can give new hope to sufferers of advanced lung cancer.

Currently, 90% of metastatic lung cancer patients will die within one year if they do not receive treatment, and the best current remedy only increases one-year survival rates by ~35%. In a study of 12 patients with stage IIIB or IV non-small-cell lung cancer, small doses of suramin were administered together with paclitaxel and carboplatin (standard chemotherapy drugs). After approximately nine months, the tumours had not advanced in eight of the patients and, in seven cases, the tumours had actually reduced in size.

Suramin has been investigated by cancer researchers for the past couple of decades but one problem has been trying to find an appropriate dose. In previous experiments on mice, suramin and chemotherapy treatment eliminated lung cancer in some cases. In humans, high doses of suramin can attenuate tumour growth but it can also be toxic at these levels; meanwhile, low doses of the drug often have no effect on the cancer.

Researchers already know that metastatic tumours produce high quantities of fibroblast growth factors (FGFs) that could inhibit anticancer drugs from getting to the tumour. Miguel Villalona (Ohio State University) said 'We are still trying to explain how the inhibition of FGF by suramin leads to a decreased resistance of tumours to chemotherapy.' Currently, the researchers are using a patient's gender and weight to set the dose of suramin, and they have found that very low doses administered before treatment with paclitaxel and carboplatin halted FGF-induced resistance to chemotherapy.

The researchers say that the addition of suramin to the normal chemotherapy procedures did not produce any extra side effects or increase those effects commonly seen with paclitaxel and carboplatin such as weakness, hair loss, low blood-cell counts, numbness in the extremities, or nausea and vomiting.

Miscellaneous

EU companies need to do homework on new drug legislation

Pharmaceutical companies should prepare for the effects of forthcoming European Union legislation, claimed a leading European lawyer recently, if they are to take advantage of the opportunities that will be presented. If companies do not 'understand the proposed reforms…and its implications for their business', they will miss chances to 'improve their competitiveness', said Andre Bywater of law-firm Eversheds (London, UK).

The European Medicines Evaluation Agency (EMEA, London, UK) approves pharmaceuticals for marketing in the EU. 'Although the EMEA performs its role competently, there is concern over the length of time it takes,' says Bywater. The reforms are designed to rationalize and simplify the regulatory process and improve the transparency of procedures and decision-making in an attempt to catch up with the US Food and Drug Administration (FDA). The changes will include the introduction of a 'fast-track' approval procedure for certain drugs where patients could benefit from immediate usage. The EMEA is also expected to begin providing scientific advice to small- and medium-sized pharmaceutical companies on how to develop biotechnological products.

Unused computing power turned to amyloidogenic disease research

Researchers at Stanford University (Stanford, CA, USA) are collaborating with Intel (Santa Clara, CA, USA) to gain access to the vast computing power offered by its Alzheimer and Amyloidogenic Disease Research Program. The program will simulate the conditions that cause proteins to misfold and should, therefore, lead to a better understanding of amyloidogenic diseases.

Supported by the Alzheimer's Association, the researchers will benefit from Intel's peer-to-peer computing program run for the website. Visitors can download a program (http://www.intel.com/cure) that connects the spare capacity of their personal computers to a vast network of machines, therefore, cheaply creating a large processing power.

More than one million PCs have signed up to the program, already creating a

processing power in excess of the top ten supercomputers in the world combined, commented Patrick Gelsinger, Chief Technology Officer at Intel. The program, which acts in a similar way to a screensaver but runs constantly, automatically sends results back to Stanford and requests new data when ready. 'This computing power makes it possible to do simulations that were only dreamed of before,' said Vijay Pande, Project Director and Assistant Professor of Chemistry at Stanford University.

Funds for new biomedical research networks

Universities in Arkansas and Idaho have recently each received three-year grants of US$6 million from the National Institutes of Health (NIH; Bethesda, MD, USA) to set up Biomedical Research Infrastructure Networks (BRIN). The University of Arkansas for Medical Sciences (Little Rock, AR, USA), the University of Arkansas (Fayetteville, AR, USA) and the University of Arkansas at Little Rock (Little Rock, AR, USA) will use their grant to enhance the research opportunities for professors and students that exist in the state. The grants will also be used to stimulate more scientists to apply for Federal grant proposals, and to enhance their expertise in bioinformatics, genomics, proteomics and digital microscopy.

'We have an untapped potential of students who attend colleges with few laboratories and research facilities,' says Donald Bobitt, Associate Dean at the Fulbright College of Arts and Sciences at the University of Arkansas and Director of Recruitment and Mentoring for BRIN. 'If we can educate a group of people at the graduate level, we will be able to attract biomedical research opportunities to the State,' he said.

In Idaho, the BRIN will include the University of Idaho (Moscow, ID, USA), Idaho State University (Pocatello, ID, USA) and Boise State University (Boise, ID, USA). As in Arkansas, the network will aim to rapidly share biomedical data produced by cooperating scientists by establishing a bioinformatics network across the three universities, to expand their current expertise in genetic sequencing and microarray analysis, and to provide new educational facilities at all three institutions.

Novel antidepressants poised for battle with generic drugs

The success of new antidepressant agents over generic products will be determined by whether they can treat a broader base of patients, whether they have a clean side-effect profile, and whether they have a faster action, concludes a recent Decision Resources (Waltham, MA, USA) report entitled Competitive Landscape. The report, which studies the effects of patent expiry on the antidepressant market, says that primary care physicians do not expect all users of antidepressants to switch to generic alternatives such as fluoxetine (for Prozac). Some branded selective serotonin reuptake inhibitors (SSRIs), such as Pfizer's Zoloft, are expected to be affected much more. Physicians were also unlikely to prescribe generic fluoxetine if a patient had a good record with another SSRI.

Eli Lilly (Indianapolis, IN, USA) is to combat the US patent expiry of fluoxetine by marketing Prozac-weekly, a once-a-week version. Reformulated SSRIs will also be marketed by Lundbeck (Copenhagen, Denmark) and Forest Laboratories (New York, NY, USA), which co-market citalopram (Celexa), Elan (Dublin, Ireland) and Solvay (Brussels, Belgium), which co-markets fluvoxamine (Luvox) and GlaxoSmithKline (London, UK), which market paroxetine (Paxil). Another way Eli Lilly plans to preserve revenue is by marketing a serotonin and norepinephrine reuptake inhibitor (SNRI), duloxetine. American Home Products (Madison, NJ, USA; with another SNRI venlafaxine) and Sepracor (Marlborough, MA, USA; which has a triple-acting neurotransmitter uptake blocker) believe that targeting more than one receptor will provide increasingly important alternatives to SSRIs.

News in Brief was written by *Natalie Baderman*, *Joanne Clough*, *Joanna Milburn*, *Joanna Owens* and *Ben Ramster*

People

Awards

'Best of Biotech' awards

James Thomson and Carl B. Feldbaum were the recipients of two key awards at the 'Best of Biotech 2001' awards during the biotech CEO-only *14th Annual Biotech Meeting* recently in Laguna Niguel.

Thomson was awarded the '2001 Scientific Contribution Inductee to the Biotech Hall of Fame' for his team's accomplishments in isolating and culturing human embryonic stem cells at the University of Wisconsin-Madison in 1998.

Meanwhile, Feldbaum was awarded the '2001 Individual Inductee into the Biotech Hall of Fame' for his leadership of the Biotechnology Industry Organization (BIO), engendering strong relationships with the White House, US Congress and US federal regulatory agencies. Before his position at BIO, Feldbaum was Chief of Staff to Senator Arlen Specter, and has held a number of positions such as President of Palomar Corporation, Assistant to the US Secretary of Energy, and Inspector General for Defense Intelligence in the US Department of Defense.

Other recipients of awards included Novartis' Gleevec (imatinib mesylate) for 'Best New Approved Therapeutic Product', Human Genome Sciences for 'Most Important Financing of the Year', CuraGen/Bayer for 'Most Creative and Significant Strategic Alliance Deal' and

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