Hope for Curing Pancreatic Cancer

A gene therapy that prevents tumor cells from growing in mice could one day offer hope to sufferers of hard-to-treat pancreatic cancer, new research suggests.

According to New Scientist, Pancreatic cancer is the fifth-leading cause of cancer deaths in the West and is virtually untreatable--only 3% of patients are alive five years after diagnosis. Most die within six months of diagnosis, since symptoms do not usually appear until the cancer is very advanced.

Researchers at Shanghai Second Medical University in China researched a human protein called vasostatin, which studies have shown suppresses the development of new blood vessels.

Tumor cells--particularly solid tumors such as pancreatic tumors--are heavily dependent on a good blood supply to enable them to grow.

Once they reach a size of 2 cubic millimeters, tumors need to develop their own blood vessels--a process known as angiogenesis--to ensure a constant supply of the nutrients needed for rapid malignant cell growth.

Yao-Zong Yuan and colleagues used a stripped-down virus that was genetically modified to carry the vasostatin gene and could penetrate tumor cells. They took a group of mice that had human pancreatic tumor cells grafted onto their flanks and infected them with the GM virus.

After 72 hours, there was significant tumor growth in a control group of mice that had not received the injection, whereas tumor growth had been curbed in the treated mice.

Following seven rounds of the therapy, the researchers found that although vasostatin appeared to have little impact on existing pancreatic cells, their proliferation was greatly reduced and angiogenesis had been significantly inhibited.

The method "may be a potent strategy to treat many malignant tumors, including pancreatic cancer, and represents a promising therapeutic option for malignancy with a poor prognosis", the researchers write.

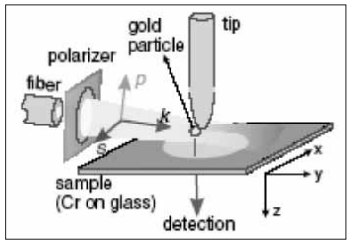
Optical Microscopy Gets New Look

Physicists in Switzerland and Germany have made a new type of optical microscope that can produce images without capturing light from the sample, PhysicsWeb reported.

The new device relies on measuring changes in the properties of a gold nano-particle placed next to the sample. The "nanoantenna" could have application in sensing devices.

Scientists have known for many years that the electronic structure of an atom can be modified by placing it close to a boundary. Now, Vahid Sandoghdar and colleagues at the Swiss Federal Institute of Technology (ETH) in Zurich, the Zuse Institute in Berlin, and the University of Potsdam, also in Germany, have exploited this phenomenon to perform high-resolution microscopy.

The new technique is very different from other forms of optical microscopy because it does not involve the detection of photons from the object being imaged. Instead, it relies on measuring how the intrinsic properties of the gold nanoantenna--such as its resonance frequency and line width--change when it is placed close to a sample.



Schematic of the experimental set-up

Sandoghdar and co-workers began by mounting a single gold nanoparticle on the end of a glass fiber tip. Next, they focused white light from a Xenon lamp onto the end of the tip, which excited a resonance frequency in the nanoantenna.

Finally, they measured the resonance wavelength and line width of the antenna while scanning it across the surface of a sample. By plotting these quantities for different positions of the tip with respect to the sample, they were able to obtain an image.

Although Sandoghdar and co-workers used photons to read the spectrum of the nanoantenna, they say that electric current could easily be used to excite a resonance frequency in the gold instead.

Moreover, the method is capable of sub-wavelength resolution because imaging takes place very close to the sample in its "near field".

"I am not sure how far this method will go into applications as a real microscopy method--that is, you give me an unknown sample and I will tell you what it is made of--but one promising application is in sensing," says Sandoghdar. "We have shown that we can have a controlled nanoscopic probe that is very sensitive to slight changes of the dielectric constant in its surroundings."

Test Can Identify Alzheimer's Before Symptoms Show

Brain researchers are developing tests that can identify the beginnings of Alzheimer's years before the first clinical signs of the disease emerge.

According to nature.com, the researchers, who presented their results on 14 November at the annual meeting of the Society for Neuroscience in Washington DC, say the tests allowed them to single out people who went on to develop the condition. If those results are repeated using larger study groups, doctors could start using the tests straight away.

One test uses brain scans to spot the first hints of problems that will later cause dementia. William Jagust of the University of California, Berkeley, and his group tracked about 60 healthy old people for around three years, using two brain-imaging techniques and exercises designed to probe memory and cognition.

Six of the group developed forms of dementia and several others started to suffer from the cognitive impairments that precede full-blown Alzheimer's. When Jagust looked back at the scans taken at the start of the project, he found that several brain areas showed tell-tale signs in these subjects.

Neural activity in temporal and parietal lobes, for example, was below average in people that later scored poorly in cognitive tests.

Catherine Myers at Rutgers University in Newark, New Jersey, and her colleagues have taken a different approach. Researchers already know that the hippocampus, a brain area involved in the formation of new memories, shrinks as Alzheimer's progresses.

Myer decided to see whether she could pick up problems in the same area before the disease could be diagnosed.

Using an adapted version of a psychological test known to measure hippocampal damage in animals, together with a test for remembering words, she was able to identify seven of the 19 people from a group of around 60 who went on to develop Alzheimer's or cognitive impairments in the two years of the study. The subjects, aged around 70, were all healthy at the start of the project.

Both Myers and Jagust say the long-term aim of their work is to tie the tests in with future drug treatments. Several drugs are being developed to inhibit the build up of the plaques and tangles of protein that build up in the brain and cause Alzheimer's, and these treatments are likely to be most effective if they can be applied before clinical signs of the disease emerge.

"A molecular treatment for Alzheimer's will be possible in the future," predicts Jagust, "so there has been a surge of interest in diagnosis."

Neither predictive test is ready to deploy, however. Myers wants first to replicate her results using a group two or three times bigger than the one she has been working with. Jagust plans to repeat his tests while using a new technique that allows researchers to measure, using a brain scan, levels of the molecules that cause plaques and tangles.

Path to True Happiness

Experts believe they have found the essential ingredients to make a person's life happier.

According to BBC News website, six specialists from a variety of disciplines worked to improve the happiness levels of a typical UK town.

The experts tried and tested 10 simple measures in the quest for happiness.

They found successful strategies included nurturing a plant, smiling at strangers and cutting television viewing by a half.

The happiness team includes psychologist Dr. Richard Stevens, psychotherapist Brett Kahr, work place specialists Jessica Pryce-Jones and Philippa Chapman, social entrepreneur Andrew Mawson OBE and Richard Reeves, whose expertise spans philosophy, public policy and economics.

During the series, they take 50 volunteers from Slough, with the aim of planting the "seeds of happiness" amongst this core group who will then spread their cheer to others in a ripple effect.

Dr. Stevens explained, "The volunteers will take their newfound skills and attitudes out into the community, and in this way we will begin to change the psychological climate of Slough."

Based on best knowledge and research, the team came up with a 10-point plan for happiness.

The experts measured the happiness levels of the Slough volunteers before, during and after the end of the project to assess if their methods were effective.

Throughout their experiment, the expert team faces the challenge of selling their science to a potentially skeptical public, unprepared for their unconventional approach--from dancing in a supermarket aisle, to a spot of graveyard therapy and tree hugging.

Dogs Relax Heart Patients

Dogs are better at relaxing heart-failure patients than people, a new study found.

"Dogs are a great comfort," says study leader Kathie Cole of the UCLA Medical Center. "They make people happier, calmer and feel more loved. That is huge when you are scared and not feeling well."

According to LiveScience, researchers studied 76 people hospitalized with heart failure. Each got either a 12-minute visit from a human volunteer or a human volunteer and a dog. A control group got no visit. The dogs were specially trained to lie on the bed and interact with the patient.

The scientists monitored the patients' blood pressure, release of harmful hormones and other measurables that characterize heart failure. An anxiety test was done before and after the session.

Anxiety scores dropped 24 percent among patients interacting with a dog. Scores dropped 10 percent when only a human visited. The group that got no visit exhibited no change.

Dogs helped cause a 17 percent drop in a stress hormone called epinephrine, while human visitors could muster only a 2 percent dip. The hormone level rose 7 percent, on average, in the group that got no visitor.

Similar improvements were seen in other measures.

"This study demonstrates that even a short-term exposure to dogs has beneficial physiological and psychosocial effects on patients who want it," Cole said. "This therapy warrants serious consideration as an adjunct to medical therapy in hospitalized heart failure patients."

Sperm Stem Cells Similar to Embryonic Ones

New experiments that prevented rat sperm stem cells from changing permanently into sperm have brought researchers one step closer to coaxing such cells to behave like embryonic stem cells, capable of growing into many other types of cells in the body.

According to Eurekalert, researchers at the Cecil H. and Ida Green Center for Reproductive Biology Sciences at UT Southwestern Medical Center devised methods to keep male rat germ-line stem cells--sperm precursor cells--from differentiating, or changing, into sperm proper.

The researchers also froze the sperm stem cells, thawed them, and transplanted them back into rat testes, where they developed into normal sperm.

Dr. David Garbers, professor of pharmacology, director of the Green Center said that the ability to manipulate male germ-line stem cells and get them to grow and self-renew is a major step.

Pluripotent cells have the potential to change into many other types of cells in the body, such as liver cells and brain cells. Their potential use in humans to treat diseases like diabetes and Parkinson's is controversial because currently the only source of such cells for research is human embryos or mouse cells.

Ordinarily, when germ stem cells divide into two cells, one "daughter" cell differentiates to become a sperm while the other remains a stem cell. Until recently, researchers had been unable to keep such germ-line stem cells from differentiating for extended periods of time.

In contrast, embryonic stem cells from mice and humans have been kept from differentiating indefinitely.

Armed with a long-lived, renewable source of rat sperm stem cells, researchers at UT Southwestern are now working to genetically manipulate those cells.

Although genetic modification of human sperm is not one of their goals, the researchers say it may be possible someday to correct genetic defects in humans--cystic fibrosis, for example--by identifying and eliminating in culture a man's sperm stem cells that carry the gene.

One of the breakthroughs in this study was developing a new type of medium to grow the cells in, and another was the use of a genetically manipulated "tag" that specifically labeled germ cells with a green fluorescent protein, making the germ cells easier to identify when mixed with other cell types.

Fungi, a Tool Against Malaria

Fungi native to East Africa could be used as a new tool in the fight against malaria, recent studies suggest.

According to BBC News website, an international team of scientists from the Netherlands, Tanzania and the UK say their technique could significantly reduce malaria cases.

Their research has been presented at the Fourth pan-African Malaria Conference in Yaounde, Cameroon.

When fungi infect certain insects, including malaria-carrying mosquitoes, they grow and quickly kill the animal.

New studies show that a specific type of fungus native to East Africa can infect mosquitoes and reduce their lifespan by two-thirds - to just seven days.

Professor Willem Takken from Wageningn University in the Netherlands said the fungus also stops live mosquitoes from transmitting the malaria parasite to humans.

"The minute a mosquito becomes infected it basically stops its blood-feeding behavior," he said. "It seems as if it is no longer hungry. It will still take some water or any other juice but no longer blood.

"And secondly we find that mosquitoes that are infected with the fungus can no longer bring the malaria parasite to development."

Studies carried out in Tanzania, where the researchers covered 20% of surfaces where mosquitoes rest with fungus-covered cotton sheets, led to a drop in malaria transmission of 76%.

They are so confident about their work that they believe the fungus technique could lead to small-scale industry in towns across Africa, where the spores could be grown on sorghum and rice flour.

They calculate that within four years this method could even replace insecticide-treated bed nets as a way of controlling mosquitoes.

The scientists also believe that unlike with insecticides, where as many as 80% of mosquitoes are no longer killed by the compounds, the insects are unlikely to develop resistance to the fungus as it targets many different genes in the parasite.