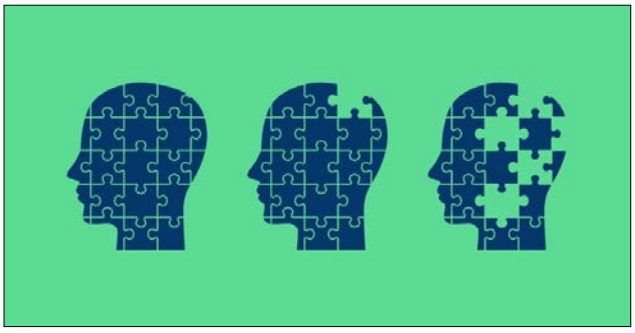
Having Both Hearing and Visual Impairments can Lead to Elevated Dementia Risk

In a recent study, researchers suggest that older adults with both hearing and visual impairments and dual sensory impairment had a significantly higher risk for dementia. The study is published in *Alzheimer's & Dementia: Diagnosis, Assessment & Disease Monitoring.*

In the study of 2,051 older adults (22.8% with hearing or visual impairment and 5.1% with both impairments) who were followed over eight years, dual sensory impairment was associated with an 86% higher risk for dementia compared with having no sensory impairments. During follow-up, dementia developed in 14.3% in those with no sensory impairments, 16.9% in those with one sensory impairment, and 28.8% in those with dual sensory impairment.

Participants with dual sensory impairment were also twice as likely to develop Alzheimer's disease



as those without sensory impairments. "Evaluation of vision and hearing in older adults may predict who will develop dementia and Alzheimer's. This has important implications on identifying potential participants in prevention trials for Alzheimer's disease, as well as whether treatments for vision and hearing loss can modify risk for dementia," said lead author Phillip H. Hwang, of the University of Washington,USA.

Metabolomics and Genomics Together Improve Patient Diagnosis

Dr. Sarah Elsea and her colleagues from Baylor College of Medicine, USA have been working on improving their ability to identify the genetic cause of undiagnosed conditions. Their study appears in the journal *Genetics in Medicine.*

To identify the genetic cause of undiagnosed conditions, the researchers look for potentially defective genes in the patient's genome. They used whole-exome sequencing. A gene may have many variants that encode slightly different versions of the same protein that still carry their function normally. But some variants may encode defective proteins that can cause disease. The challenging part is determining whether the variant of a particular gene that is found in a patient is causing the disease. That one 'misspelled' gene sequence may or may not result in a defective or less functional protein, and we need other mechanisms, such as untargeted metabolomics, to determine if that genetic change causes disease," said Elsea, who also is the senior director of biochemical genetics at Baylor Genetics.

In the current study, the researchers integrated whole-exome sequencing and targeted metabolomics to analyze the data of a group of 170 patients. They found that the metabolomics data informed 44 percent of the cases. "The analysis let us reclassify nine variants as likely benign, 15 variants as likely causing disease and three as disease-causing variants. Metabolomics data confirmed a clinical diagnosis in 21 cases," Elsea said. "Our analysis is extremely helpful not only for confirming that a variant causes the condition, but also to rule out variants as the cause of disease. Having a more accurate diagnosis helps identify a better treatment for the condition and also provides important information for the family regarding recurrence risk," she concluded.

Blood Test to Guide Treatment for Most Aggressive Prostate Cancer

Scientists have developed a simple blood test that can show which men with the most aggressive type of prostate cancer should respond to conventional therapy, and those who need other options. Researchers from Peter Mac and the Monash University School of Clinical Science, in collaboration with Chris O'Brien Lifehouse, have collaborated with California-based biotechnology company, Predicine, to apply liquid biopsy for men with metastatic castration-resistant prostate cancer (mCRPC).

From as little as 10ml of blood, the test can simultaneously profile the circulating DNA and RNA which is shed by cancer cells, offering important insights into the make-up of the cancer and treatments most likely work. "While advances in therapeutic strategies have significantly improved quantity and quality of life for men with mCRPC, there

remains a pressing need to find predictive and prognostic biomarkers," explains Prof. Arun Azad, senior author on the study and medical oncologist at Peter Mac.

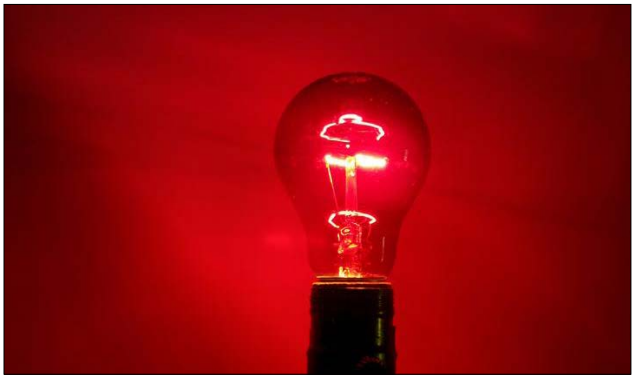
These liquid biopsies have emerged as a minimally-invasive alternative to conventional biopsy for interrogating the prostate tumor genome. Liquid biopsies have demonstrated strong congruence with tumor biopsies, whilst simultaneously encapsulating the genomic complexity often seen in mCRPC. In this study, published in the journal *European Urology*, researchers applied Predicine's cell-free DNA and cell-free RNA next generation sequencing liquid biopsy technology to detect whether changes to the Androgen Receptor (AR) gene have occurred within mCRPCs. They used this to test the blood of Australian men with mCRPC prior to treatment, accurately detecting some form of AR alteration in over half of patients. "We found that abnormalities in the AR gene detected in the blood of men with advanced prostate cancer were associated with poor responses to available drug treatments and reduced survival," says Azad. A simple test to detect AR abnormalities would help doctors determine optimal treatment selection, better design innovative clinical trials, and aid in discussions with patients and caregivers around realistic and expected outcomes.

Staring at Deep-Red Light can Improve Declining Eyesight

Staring at a deep red light for three minutes a day can significantly improve declining eyesight, finds a new UCL-led study, the first of its kind in humans. The study has been published in the *Journals of Gerontology*. Scientists believe the discovery could signal the dawn of new affordable home-based eye therapies, helping the millions of people globally with naturally declining vision.

Lead author, Professor Glen Jeffery, UCL Institute of Ophthalmology said, "As you age your visual system declines significantly, particularly once over 40. To try to stem or reverse this decline, we sought to reboot the retina's aging cells with short bursts of longwave light." In humans around 40 years-old, cells in the eye's retina begin to age, and the pace of this aging is caused, in part, when the cell's mitochondria also start to decline.

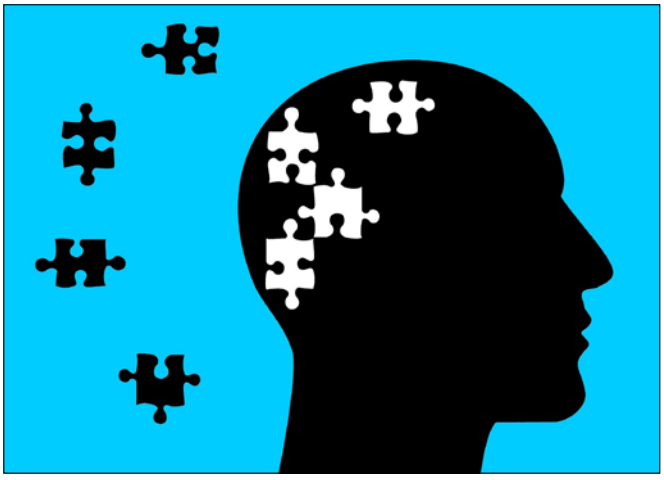
For the study, 24 people (12 male, 12 female), aged between 28 and 72, who had no ocular disease, were recruited. All participants' eyes were



tested for the sensitivity of their rods and cones at the start of the study. All participants were then given a small LED torch to take home and were asked to look into its deep red 670nm light beam for three minutes a day for two weeks. They were then re-tested for their rod and cone sensitivity. Researchers found the 670nm light had no impact in younger individuals, but in those around 40 years and over, significant improvements were obtained. Cone colour contrast sensitivity improved by up to

20% in some people aged around 40 and over. Improvements were more significant in the blue part of the colour spectrum that is more vulnerable in aging. Rod sensitivity also improved significantly in those aged around 40 and over, though less than colour contrast. The technology is simple and very safe, using a deep red light of a specific wavelength that is absorbed by mitochondria in the retina that supply energy for cellular function.

Antioxidant Therapy to Prevent Alzheimer's



Research from The University of Western Australia has found a diet rich in nutrients and antioxidants may prevent or even reverse the effects of Alzheimer's disease. The study, published in *Open Biology*, found taking a combination of antioxidants at increasing doses was more beneficial at preventing the disease than any other treatment currently available.

Dr. Gerald Veurink carried out the research while working at UWA's Medical School and examined a range of antioxidants to discover which ones were most effective at protecting the neurons in the body's nervous system. He found complex phenolic carotenoid, as well as antioxidants such as vitamin C and vitamin E in high concentrations, were most effective at reducing the risk of Alzheimer's disease. Dr. Veurink said while a nutrient-rich diet helped stabilize the pH levels in the body that caused oxidative stress, the simultaneous supplementation of an antioxidant combination cocktail was most effective at preventing and managing chronic disease. "The combination of antioxidants at sufficiently high, personalized doses and a nutrient-rich, low-carbohydrate diet appears to have the biggest impact on patients suffering with Alzheimer's," Dr. Veurink said.

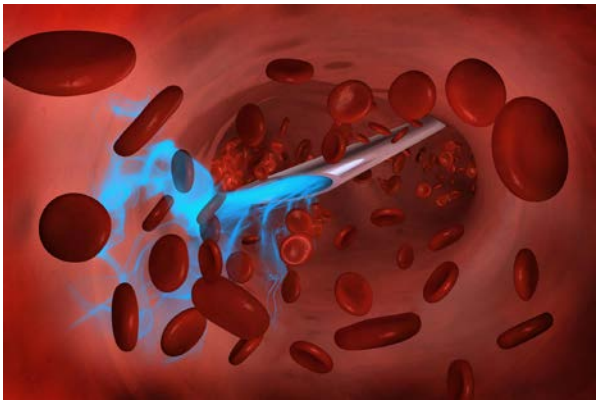
Yale Researchers Find On-Off Switch for Inflammation Related to Overeating

Researchers at Yale have identified a molecule that plays a key role in the body's inflammatory response to overeating, which can lead to obesity, diabetes, and other metabolic diseases. The finding suggests that the molecule can be a promising therapeutic target to control this inflammation and keep metabolic diseases in check. The study appears in the *Proceedings of the National Academy of Sciences.* As the amount of calories consumed continues to increase, it leads to inflammation in adipose tissue and the release of fatty acids into other tissues, including the liver and muscles.

The new research by Yang and team zeroed in on a pathway called O-GIcNAc signaling, which activates when a person overeats, instructing the cells to limit inflammation. "The body is smart," said Yang, associate professor of comparative medicine and of cellular & molecular physiology. "It tries to protect against inflammation when fat builds up in the body. We discovered a key pathway that quenches inflammation caused by overnutrition." In particular, the researchers found that OGT (O-GIcNAc transferase), an enzyme that activates GIcNAc signaling, was responsible for activating the body's pro-inflammatory response by turning on or off a specific signalling pathway in macrophages.

"The macrophage can be a good guy or a bad guy," Yang said. "It becomes a bad guy in overnutrition, secreting a lot of inflammatory factors. In other contexts, it's a good guy and has an anti-inflammatory effect. We found out that OGT tries to stop the macrophage from becoming a bad guy i.e. to stop the pro-inflammatory response." Their finding suggests that OGT could be a target for new therapies to suppress inflammation and improve health.

Stanford Researchers Develop New Ultrafast Insulin



Researchers at Stanford University are developing a new insulin formulation that begins to take effect almost immediately upon injection, potentially working four times as fast as current commercial fast-acting insulin formulations.

The researchers focused on monomeric insulin as should allow it to act faster than other forms of insulin. However, monomeric insulin is too unstable for practical use. "The insulin molecules themselves are fine, so we wanted to develop a 'magic fairy dust' that when added into a vial that would help to fix the stability problem," said Eric Appel, assistant professor of materials science and engineering at Stanford.

The researchers have found one additive polymer that could stabilize monomeric insulin for more than 24 hours in stressed conditions and confirmed the ultrafast action of their formulation in diabetic pigs. Their results were published in *Science Translational Medicine.*

The ultrafast-absorbing insulin is based on simpler insulin monomer molecules, which are absorbed faster than the more complex dimers and hexamers used in commercial rapid-acting insulin analogs. In commercial insulin, which typically remains stable for about 10 hours in accelerated aging tests, the polymer drastically increased the duration of stability for upwards of a month. The next step was to see how the polymer affected monomeric insulin, which on its own aggregates in 1-2 hours. The researchers were able to evaluate their new monomeric insulin formulation in diabetic pigs and found that their insulin reached 90 percent of its peak activity within five minutes after the insulin injection. Furthermore, the monomeric insulin activity peaked at about 10 minutes while the commercial insulin required 25 minutes. In humans, this difference could translate to a four-fold decrease in the time insulin takes to reach peak activity. The monomeric insulin also finished its action sooner. Both beginning and ending activity sooner makes it easier for people to use insulin in coordination with mealtime glucose levels to appropriately manage their blood sugar levels.

Diagnosing Brain Tumours by Routine Blood Tests Using Machine Learning

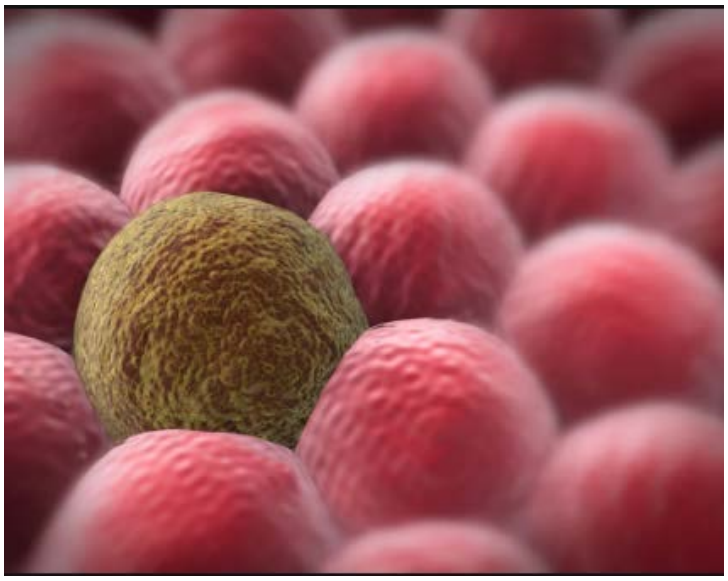
A simple but highly sensitive blood test has been found to accurately diagnose and classify different types of brain tumours, resulting in more accurate diagnosis, less invasive methods and better treatment planning for patients. The findings published in *Nature Medicine* describe a non-invasive and easy way to classify brain tumours. "If we had a better and more reliable way to diagnose and subtype tumours, we could transform patient care," says Dr. Gelareh Zadeh, Medical Director of the Krembil Brain Institute, Head of Surgical Oncology at the Princess Margaret Cancer Centre, Senior Scientist at the Princess Margaret Cancer Research Institute, Professor of Surgery, University of Toronto, and a co-senior author in the study.

Senior Scientist Dr. Daniel De Carvalho at Princess Margaret Cancer Centre has previously developed a DNA methylation-based liquid biopsy approach to profile hundreds of thousands of these epigenetic alterations in DNA molecules circulating in the blood. These fragments are called circulating tumour DNA or ctDNA. Combining this new technology with machine learning, his team was able to develop a highly sensitive and accurate test to detect and classify multiple solid tumours. Drs. Zadeh and De Carvalho decided to use the same

approach in the application of intracranial brain tumour classification. The clinicians and scientists tracked the cancer origin and type by comparing patient tumour samples of brain cancer pathology, with the analysis of cell-free DNA circulating in the blood plasma from 221 patients.

Using this approach, they were able to match the circulating plasma ctDNA to the tumour DNA, confirming their ability to identify brain tumour DNA circulating in the blood of these patients. Then, using a machine learning approach, they developed a computer program to classify the brain tumour type based solely on the circulating tumour DNA. "This test is so sensitive in picking up even small amounts of highly specific tumor-derived signals in the blood, we have a new, non-invasive way of detecting and discriminating between common brain tumors," explains Dr. Zadeh.

Researchers Use Ultrasound-Powered Microbubbles to Destroy Cancer Cells



An international research team led by Dr. Tali Ilovitsh of the Biomedical Engineering Department at Tel Aviv University developed a non-invasive technology platform for gene delivery into breast cancer cells. The technique combines ultrasound with tumour-targeted microbubbles. Once the ultrasound is activated, the microbubbles explode like smart and targeted warheads, creating holes in cancer cells' membranes, enabling gene delivery. The research was published in the journal *Proceedings of the National Academy of Sciences (PNAS).* The technique utilizes low frequency ultrasound (250 kHz) to detonate microscopic tumour-targeted bubbles. In vivo, cell destruction reached 80% of tumour cells.

"Microbubbles are microscopic bubbles filled with gas, with a diameter as small as one tenth of a blood vessel," Dr. Ilovitsh explains. "At certain frequencies and pressures, sound waves cause the microbubbles to act like balloons: they expand and contract periodically. This process increases the transfer of substances from the blood vessels into the surrounding tissue. We discovered that using lower frequencies than those applied previously, microbubbles can significantly expand, until they explode violently. We realized that this discovery could be used as a platform for cancer treatment and started to inject microbubbles into tumours directly."

Dr. Ilovitsh and the rest of the team used tumour-targeted microbubbles that were attached to tumour cells' membranes at the moment of the explosion, and injected them directly into tumours in a mouse model. "About 80% of tumour cells were destroyed in the explosion, which was positive on its own," says Dr. Ilovitsh. "The targeted treatment, which is safe and cost-effective, was able to destroy most of the tumour. However, in order to prevent the remaining cancer cells to spread, we needed to destroy all of the tumour cells. That is why we injected an immunotherapy gene alongside the microbubbles, which acts as a Trojan horse, and signalled the immune system to attack the cancer cell." Membrane pores were formed in the remaining 20% of the cancer cells that survived the initial explosion, allowing the entry of the gene into the cells. This triggered an immune response that destroyed the cancer cell. "The majority of cancer cells were destroyed by the explosion, and the remaining cells consumed the immunotherapy gene through the holes that were created in their membranes," Dr. Ilovitsh explains.

BCG Vaccine Helps Fight Infections by Boosting Immune Cell Production

Together with colleagues from Australia and Denmark, researchers from Radboud University medical centre the universities of Nijmegen and Bonn have presented several studies testing the use of the vaccine in preventing severe disease progression in populations at risk such as hospital staff and elderly individuals. The study is published in the journal *Cell Host & Microbe.*

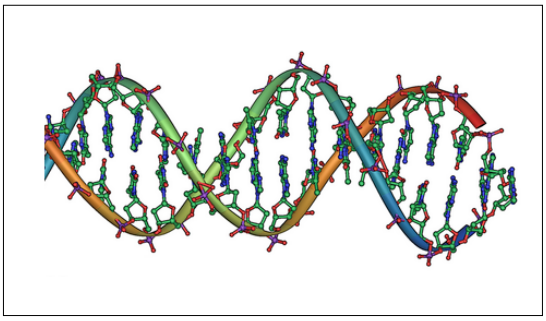
The BCG vaccine is the only vaccine that provides effective protection against infections with the tuberculosis bacterium. An unexpected side-effect became apparent: vaccinated individuals not only contracted tuberculosis far less frequently, but also other infections.

A similar effect has now been observed with other vaccines, almost exclusively with those based on live pathogens. "We vaccinated 15 volunteers with the BCG vaccine and administered a placebo to five more people for comparison," explains Prof. Dr. Mihai Netea from the Radboud university medical centre in Nijmegen, the Netherlands. "Three months later, we took both blood and bone marrow samples from these individuals." Differences observed in the two groups were striking, for instance, the immune cells in the blood of vaccinated individuals released significantly more inflammatory messengers. The cytokines strengthen the effectiveness of the immune defense and direct them to the site of infection. Moreover, the immune cells of vaccinated individuals showed activity of completely different genes than in the placebo group, especially those required for cytokine production.

"We have found that after vaccination, certain genetic material becomes more accessible, which means that it can be read by the cells more frequently," explains Prof. Dr. Andreas Schlitzer from LIMES Institute at the University of Bonn. Another aspect is the genes that become more accessible after the vaccine has been administered, are additionally controlled by a molecule called HNF. This 'hepatic nuclear factor' ensures that the immune cells use their newly acquired power prudently, meaning that they only release cytokines when there is actually a pathogen that needs to be attacked. "It may be possible to use this finding therapeutically to specifically manipulate the trained immunity," explains LIMES researcher Prof. Schlitzer.

Endometriosis Linked to DNA Changes in the Uterus

DNA from uterine cells of women with endometriosis has different chemical modifications, compared to the DNA of women who do not have the condition, according to researchers funded by the National Institutes of Health. The changes involve DNA methylation which can alter gene activity. Moreover, the methylated DNA regions varied according to the stage, or severity, of endometriosis and responded differently to hormones involved in the menstrual cycle. Uterine responses to hormones influence pregnancy and other functions of uterine tissue. The study was conducted by Linda C. Giudice, M.D., Ph.D., and colleagues at the University of California, San Francisco. It appears in *PLOS Genetics.*



"The findings raise the possibility that differences in methylation patterns could be used to diagnose endometriosis and develop customized treatment plans for patients," said Stuart B. Moss, Ph.D., of NICHD's Fertility and Infertility Branch.

The researchers analyzed an endometrial stromal fibroblast, which regulates cells in the lining of the uterus. They compared methylation across DNA regions and differences in gene functioning in cells from women who did not have endometriosis or any other gynecological disorders to those of women with stage I endometriosis and of women with stage IV endometriosis. They

also observed methylation patterns and gene functioning after the cells were exposed to estradiol alone, progesterone alone, and to a combination of the two hormones to mimic changes in the levels of these hormones that occur during the menstrual cycle. DNA methylation patterns and gene functioning differed among all groups of cells i.e. before exposure to the hormones, with exposure to each individual hormone, and to the combination of the two. The differences in methylation and gene functioning between stage I and stage IV endometrial cells could mean that the two may be distinct subtypes of endometriosis, rather than different degrees of the condition, Dr. Giudice added. "The data indicates that the proper interactions of hormones and DNA methylation are critical in normal uterine function. The changes in these interactions that we've seen could play a role in the infertility that often accompanies endometriosis," said the study's lead author, Sahar Houshdaran, Ph.D., University of California, San Francisco.

A Sugar Hit to Help Destroy Cancer Cells

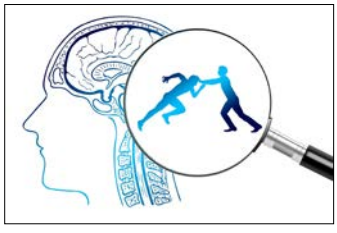
Researchers from USC Viterbi's Mork Family Department of Chemical Engineering and Materials Science have unlocked sugar infelxibility in a common type of cancer cell. That is, when cancer cells are exposed to galactose, the cells can't adapt, and will die. The discovery was led by Dongqing Zheng, a Ph.D. student in the lab of Nicholas Graham, assistant professor of chemical engineering and materials science. The research is published in the *Journal of Cell Science.*

The paper describes how oncogenes can also lead cancer cells to become inflexible to changes in their sugar supply. Zheng said that galactose is quite structurally similar to the glucose which helps cancer cells thrive, but that it has some differences. Graham said that exposing cells to galactose forces them to do more oxidative metabolism, where oxygen is used to convert sugars into energy. Normal cells can metabolize both glucose and galactose, but cancer cells that with an activated AKT signalling pathway, commonly found in breast cancer cells, cannot.

"We hadn't seen research looking at galactose in a cancer context, to see whether specific mutations can cause cancer cause cells to be better or worse at managing that switch between glycolytic and oxidative metabolism," Graham said. Zheng said that the discovery did not mean that galactose itself would be an effective treatment for AKT-type cancer cells, but that it did uncover a fundamental flaw in these cells, whereby the oxidative state leads to cell death. "Galactose is a model system that we're using to uncover these vulnerabilities in cells that would lead to drug development," Graham said. The team's findings also showed that while the oxidative process brought on by galactose did result in cell death in AKT-type cancer cells, when the cells were given a different genetic mutation, MYC, the galactose did not kill the cells. "So if you had a drug that could inhibit glycolysis, you would give it to a patient that had an AKT mutation," Graham said. "But you wouldn't give it to a patient that had an MYC mutation, because it wouldn't work theoretically for those MYC cells."

Link between Dementia and Repetitive Negative Thinking Identified

Researchers from UCL conducted a study which suggests that persistently engaging in negative thinking patterns can potentially increase the risk of Alzheimer's disease. In the



study of people aged over 55, published in *Alzheimer's & Dementia*, researchers found 'repetitive negative thinking' (RNT) is linked to subsequent cognitive decline as well as the deposition

of harmful brain proteins linked to Alzheimer's.

Lead author Dr. Natalie Marchant (UCL Psychiatry) said: "Depression and anxiety in mid-life and old age are already known to be risk factors for dementia. Here, we found that certain thinking patterns implicated in depression and anxiety could be an underlying reason why people with those disorders are more likely to develop dementia." For the Alzheimer's Society-supported study, the research team from UCL, INSERM and McGill University studied 292 people over the age of 55 who were part of the PREVENT-AD cohort study, and a further 68 people from the IMAP+ cohort. Over a period of two years, the study participants responded to questions about how they typically think about negative experiences, focusing on RNT patterns like rumination about the past and worry about the future. The participants also completed measures of depression and anxiety symptoms.

Their cognitive function was assessed, measuring memory, attention, spatial cognition, and language. Some (113) of the participants also underwent PET brain scans, measuring deposits of tau and amyloid, two proteins which cause the most common type of dementia, Alzheimer's disease, when they build up in the brain. The researchers found that people who exhibited higher RNT patterns experienced more cognitive decline over a four-year period, and declines in memory, and they were more likely to have amyloid and tau deposits in their brain. Depression and anxiety were associated with subsequent cognitive decline but not with either amyloid or tau deposition, suggesting that RNT could be the main reason why depression and anxiety contribute to Alzheimer's disease risk. The researchers suggest that RNT may contribute to Alzheimer's risk via its impact on indicators of stress such as high blood pressure, as other studies have found that physiological stress can contribute to amyloid and tau deposition.

Rice University Develops Neural Stimulator

Rice neuroengineers created the bi-layered film to power implantable neural stimulators that are approximately the size of a grain of rice. The film converts energy from a magnetic field directly into an electrical voltage, eliminating the need for a battery or wired power connection.

The neural stimulator draws its power from magnetic energy and is about the size of a grain of rice. It is the first magnetically powered neural stimulator that produces the same kind of high-frequency signals as clinically approved, battery-powered implants that are used to treat epilepsy, Parkinson's disease, chronic pain and other conditions. The research is published in the journal *Neuron.*

The implant's key ingredient is a thin film of "magnetoelectric" material that converts magnetic energy directly into an electrical voltage. The method avoids the drawbacks of radio waves, ultrasound, light and even magnetic coils, all of which have been proposed for powering tiny wireless implants and have been shown to suffer from interference with living tissue or produce harmful amounts of heat. To demonstrate the viability of the magnetoelectric technology, the researchers showed the implants worked in rodents that were fully awake and free to roam about their enclosures.

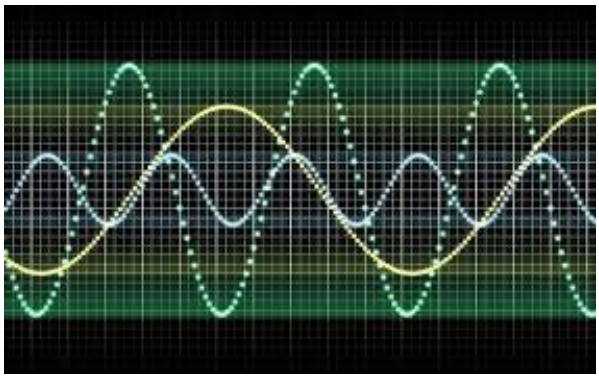
"Our results suggest that using magnetoelectric materials for wireless power delivery is more than a novel idea. These materials are excellent candidates for clinical-grade, wireless bioelectronics," said Jacob Robinson, corresponding author of the study and a member of the Rice Neuroengineering Initiative.

Tiny implants capable of modulating activity of the brain and nervous system could have wide-ranging implications. While battery-powered implants are frequently used to treat epilepsy and reduce tremors in patients with Parkinson's disease, research has shown that neural stimulation could be useful for treating depression, obsessive-compulsive disorders and more than a third of those who suffer from chronic, intractable pain

that often leads to anxiety, depression and opioid addiction.

Robinson said the miniaturization by study lead author and graduate student Amanda Singer is important because the key to making neural stimulation therapy more widely available is creating battery-free, wireless devices that are small enough to be implanted without major surgery. Devices about the size of a grain of rice could be implanted almost anywhere in the body with a minimally invasive procedure similar to the one used to place stents in blocked arteries, he added.

Scientists Develop Non-Invasive Ultrasound Neuromodulation Technique



Researchers from the Shenzhen Institutes of Advanced Technology (SIAT) of the Chinese Academy of Sciences developed a non-invasive ultrasound neuromodulation technique, which could potentially modulate neuronal excitability without any harm in the brain. Low-intensity pulsed ultrasound and ultrasound neuromodulation system were prepared for non-human primate model of epilepsy and human epileptic tissues experiments, respectively. The results showed that ultrasound stimulation could exert an inhibitory influence on epileptiform discharges and improve behavioural seizures in a non-human primate epileptic model. The study was published in *Theranostics.*

Ultrasound stimulation inhibited epileptiform activities with an efficiency exceeding 65% in biopsy specimens from epileptic patients in vitro. The mechanism underlying the inhibition of neuronal excitability could be due to adjusting the balance of excitatory-inhibitory (E/I) synaptic inputs by the increased activity of local inhibitory neurons. In addition, the variation of temperature among these brain slices was less than 0.64°C during the experimental procedure. The study demonstrated that low-intensity pulsed ultrasound improved electrophysiological activities and behavioural outcomes in a non-human primate model of epilepsy and suppressed epileptiform activities of neurons from human epileptic slices. It provided evidence for the potential clinical use of non-invasive low-intensity pulsed ultrasound stimulation for epilepsy treatment.

Statin Use among Older Adults Linked with Reduced Mortality Risk

Severl studies have shown that statins can prevent heart attacks, strokes and death in middle-aged adults. But in 28 major clinical trials of statins, only 2 percent of participants have been 75 years or older. A new study sheds light on the role statins may play for older adults who have not yet experienced a heart attack, stroke or other cardiovascular event.

In their retrospective analysis, a team of investigators from Harvard-affiliated Brigham and Women's Hospital and the VA Boston Healthcare System leverages national data from the U.S. Veterans Health Administration Services and Centres for Medicare & Medicaid Services found that the risk of dying from any cause was lower by 25 percent among veterans who were using statins compared to those who were not treated with statins. The risk of dying from a cardiovascular event, such as a heart attack or stroke, was lower by 20 percent. The team's results are published in *JAMA.*

"Statins are commonly studied and prescribed for middle-aged adults but understudied in people over age 75. One of the most remarkable things

about our results is that we found the benefit of statins held true regardless of whether a person was older or younger or had a condition such as dementia," said lead and corresponding author Ariela Orkaby, a physician scientist at the VA Boston Health Care System and in the Division of Aging at the Brigham. Overall, taking statins was significantly associated with lower risk of death from a cardiovascular event or death from any cause. And the benefits remained for veterans at advanced age, including those who were 90 years or older.

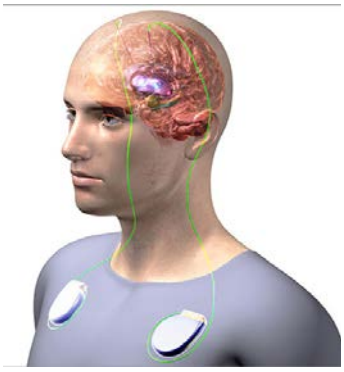
Scientists Discover a New Connection between the Eyes and Touch

Tiny eye movements can be used as an index of humans' ability to anticipate relevant information in the environment independent of the information's sensory modality, a team of scientists has found. Their work reveals a connection between eye movements and the sense of touch. "The fact that tiny eye movements can hinder our ability to discriminate tactile stimuli, and that the suppression of those eye movements before an anticipated tactile stimulus can enhance that same ability, may reflect that common brain areas, as well as common neural and cognitive resources, underlie both eye movements and the processing of tactile stimuli," explains Marisa Carrasco, a professor of psychology and neural science at New York University and the senior author of the paper, which appears in *Nature Communications.*

The study asked human participants to distinguish between two kinds of vibrations i.e. high frequency vs. low frequency that were produced by a device connected to their finger. The researchers then tracked even the tiniest of their involuntary eye movements (microsaccades). These small, rapid eye-movements are known to occur even when we try to fixate our gaze on one spot. During the study, participants were instructed to focus their vision on a fixation spot on a computer screen. A cue would announce the next imminent vibration. The time interval between that cue and the tactile vibration was a central part of the experimental design. The manipulation of that interval allowed participants in some blocks to predict with more accuracy precisely when the vibration would happen. At the end of the study, the researchers could see not only how the participants' microsaccade rates would decrease just before the vibration stimulus, but also how their ability to distinguish between fast and slow vibrations was enhanced by the suppression of micro-saccades.

Deep Brain Stimulation in the Treatment of Obsessive-Compulsive Disorder

A group of researchers from Charité–Universitätsmedizin Berlin have refined the use of deep brain stimulation in the treatment of obsessive-compulsive disorder. By accurately localizing electrode placement in the brains of patients, the researchers were able to identify a fibre tract which is associated with the best clinical outcomes following deep brain stimulation. The researchers' findings have been published in *Nature Communications.*



Deep brain stimulation involves the implantation of tiny electrodes into structures deep inside the brain. After implantation, these electrodes deliver very weak electric currents to help rebalance brain activity. By stimulating different areas of the brain, such

as a fibre tract within the internal capsule or the subthalamic nucleus, this technique can help improve clinical symptoms in some cases. Treatment success depends on the accurate placement of electrodes and requires millimeter-level precision. For the first time, a team of researchers has been able to identify a specific nerve bundle which appears to be the optimal target for stimulation. The researchers studied 50 patients with obsessive-compulsive disorder who received treatment at a number of centres around the world. Using MRI technology both before and after electrode placement, the researchers were able to visualize surrounding fibre tracts and test to see which of these the electrodes were selectively stimulating. "Our analysis shows that optimal results are linked to a very specific nerve bundle. Reliable evidence for this link was found across the cohorts of patients examined in Cologne, Grenoble, London and Madrid," explains Dr. Andreas Horn, who led the study at Charité's Department of Neurology with Experimental Neurology.

The researchers initially examined two cohorts of patients, both of which received deep brain stimulation to the internal capsule or the subthalamic nucleus. Precise electrode localizations allowed the researchers to reliably predict treatment outcomes in both of these groups. These results were then replicated in two further, independent cohorts. When comparing their results with other studies, the researchers showed that the target areas described were also located within the tract-target identified in this study. Describing the way in which these findings could help with electrode implantation, the study's first author, Ningfei Li, says: "Our results do not alter the original target area; they simply helped us to define it more precisely. Now we can aim for target area with greater accuracy."

Algorithm Predicts Risk for PTSD among Trauma Survivors

Researchers have developed an algorithm that can predict whether trauma survivors are likely to develop posttraumatic stress disorder (PTSD). The tool, which relies on routinely collected medical data, would allow clinicians to intervene early to mitigate the effects of PTSD. The study was published in *Nature Medicine.*

In the new study, the multi-site research team used supervised machine learning to develop an algorithm that computes a single PTSD risk score from a combination of 70 clinical data points and a brief clinical assessment of a patient's immediate stress response. "We selected measures that are routinely collected in the ED and logged in the electronic medical record, plus answers to a few short questions about the psychological stress response," says lead author Katharina Schultebraucks, Ph.D., assistant professor of behavioral and cognitive sciences in the Department of Emergency Medicine at the Columbia University Vagelos College of Physicians and Surgeons.

Among patients who were categorized by the algorithm as PTSD risks, 90% developed long-lasting PTSD symptoms within a year. Only 5% of patients who were free of long-lasting PTSD symptoms had been identified as at risk. Of the patients predicted to have no or few PTSD symptoms, 29% developed long-lasting PTSD (false negatives). The current algorithm was built using patients who had blood drawn. This possibly limits generalizability as the algorithm would only apply to patients who undergo blood testing, such as those with more severe injuries. In future studies, the team plans to test whether the algorithm can predict PTSD in patients who experience other potentially traumatic health events, including heart attacks and strokes.