

Supervised exercise programme helps improving heart function in type 2 diabetes patients

A low-energy diet may not help, but the function of the heart can be significantly improved in patients with type 2 diabetes through exercises, researchers in Leicester has now suggested.

The study was funded by the National Institute for Health Research (NIHR) and conducted at the NIHR Leicester Biomedical Research Centre (BRC) - a partnership between Leicester's Hospitals, the University of Leicester and Loughborough University. "Heart failure is one of the most common complications in people with type 2 diabetes, and younger adults with type 2 diabetes already have changes in their heart structure and function that pose a risk of developing heart failure," said Dr Gaurav Gulsin, a BHF Clinical Research Fellow at the University of Leicester, a trainee heart doctor, a lead author of the study.

"We wanted to confirm the abnormalities in the structure and function of the heart in this patient population using the latest scanning techniques, and explore whether it is possible to reverse these through exercise and/or weight loss," Gulsin added.

For the research, three groups were made out of Eighty-seven patients between 18 and 65 years of age with type 2 diabetes. Participants underwent echocardiography and a magnetic resonance

imaging (MRI) scan to confirm early heart dysfunction, and exercise tests to measure cardiovascular fitness.

They were then randomised into one of three groups: routine care, supervised aerobic exercise training, or a low-energy meal replacement programme.

The study found that patients who followed the supervised exercise programme had significantly improved heart function compared with the control group, and had also increased their exercise capacity. Whilst the low energy diet did not improve heart function, it did have favourable effects on the structure of the heart, vascular function and led to the reversal of diabetes in 83 per cent of this arm of the study population.

"Through this research, we have shown that lifestyle interventions in the form of regular exercise training may be important in limiting and even reversing the damage to heart structure and function seen in younger adults with type 2 diabetes," said Gerry McCann, NIHR Research Professor and Professor of Cardiac Imaging at the University of Leicester and a consultant cardiologist at Leicester's Hospitals, was senior author on the study.



Study finds that Pilates significantly improves blood pressure in young, obese women

Mat Pilates may be effective in improving the cardiovascular health of young obese women, suggests a new study. The study was published in the American Journal of Hypertension and was published by the Oxford University Press. With an estimated 9 million participants in 2018 and a series of celebrity endorsements, including Beyonce and Emma Stone, mat Pilates training has seen a recent resurgence in popularity.

It has become one of the most widely known wellness routines in the United States. The program emphasizes core strength, flexibility, body posture, and controlled breathing. At the same time, the prevalence of obesity in young adults has become a major public health issue.

Though it is well-documented that exercise is a key factor in preventing and managing cardiovascular health problems, obese women tend not to maintain traditional workout routines. Despite sources in the media reporting on the cardiovascular benefits of Pilates, the existing scientific literature is scarce.

Researchers here studied young obese women (age 19-27) with elevated blood pressure and a body mass index between 30-40kg/m2 through 12 weeks of mat Pilates. The participants were free of

chronic diseases, were non-smokers and performed less than 90 minutes of regular exercise per week.

There were three one-hour training sessions per week, which were divided into the following stages: initial warm up and stretch (10min), general mat Pilates exercises (40 min), and a cool down (10 min). The training increased over the 12 weeks, with the repetition of each exercise steadily increasing. A certified mat Pilates instructor supervised all sessions.

This is the first study to find that mat Pilates routines significantly reduced arterial stiffness and blood pressure, including central (aortic) pressure.

"We hypothesized that Mat Pilates might decrease the risk of hypertension in young obese women. Our findings provide evidence that Mat Pilates benefit cardiovascular health by decreasing blood pressure, arterial stiffness, and body fatness in young obese women with elevated blood pressure," said the researchers. Because adherence to traditional exercise (both aerobic and resistance) is low in obese individuals, Mat Pilates Training might prove an effective exercise alternative for the prevention of hypertension and cardiovascular events in young obese adults," they added.



After previous cesarean, natural birth can be considered: Study

Over 90 per cent of women who have previously had a caesarian, a natural birth may be possible, suggests new research. The study was published in the journal BMC Pregnancy and Childbirth. When given detailed information on the risks and benefits associated with the different delivery options, expectant mothers were more likely to choose vaginal birth following a previous Caesarean rather than repeat Caesarean delivery. Dr Kaname Uno, author of the study based at Toyota Memorial Hospital, Japan said: "Caesarean rates are increasing globally with almost half of decisions on whether to deliver by Caesarean based on previous Caesarean delivery. A trial of labour after Caesarean (TOLAC) is considered a safe option, but most eligible women instead undergo repeat Caesarean. This may be due to a lack of sufficient education on the risks and benefits of both types of delivery."

The authors analysed data from April 2005 to August 2017 of 1,086 pregnant women with at least one previous Caesarean delivery. Of these, 735 expectant mothers were eligible for TOLAC. They were provided with detailed explanations of the risks and benefits of TOLAC and repeat Caesarean delivery. Each of the women was asked to consider both modes of delivery and make an informed decision at 34 weeks' gestation.

Dr Uno said: "A potential risk for a vaginal birth after previous Caesarean is uterine rupture, which can occur along healed incisions from previous Caesarean deliveries. However, Caesarean births themselves carry a risk of

bleeding, infection and other complications. The benefits of successful TOLAC include a reduced risk of bleeding, infection and an improved outcome for future pregnancies."

Of the 735 expectant mothers, 471 (64.1%) opted for TOLAC and 264 (35.9%) opted for repeat Caesarean. Among the 471 women who chose TOLAC, 430 (91.3%) women had a successful vaginal birth, while 41 (8.7%) were classified as 'failed TOLAC' and delivered via Caesarean after they were unable to deliver vaginally due to complications. Of this group, three women (0.6%) experi-

enced uterine rupture but no maternal or neonatal deaths occurred. Premature rupture of membranes, prior to contractions starting, and gestation over 40 weeks were significant risk factors for failed TOLAC. In the study, 96.4% of women with a history of vaginal delivery had successful TOLAC. The results confirm previous studies indicating that labour after Caesarean can be a safe alternative to repeat Caesarean deliveries.

Dr Uno said: "Opting for vaginal birth following the previous Caesarean may increase the length of gestation, with an associated decrease in the risk of potential health complications for the child. The results suggest that health professionals should be encouraged to have ongoing discussions with expectant mothers about the risks and benefits associated with each mode of delivery, allowing them to make their own informed choices."



Traditional vegetable diet lowers risk of premature babies, says study

A study has suggested that consuming the traditional 'three-veggies' before pregnancy lowers the risk of premature birth. University of Queensland PhD candidate Dereje Gete analysed the diets of nearly 3,500 women and found high consumption of carrots, cauliflower, broccoli, pumpkin, cabbage, green beans and potatoes before conception helped women reach full-term pregnancy. "Traditional vegetables are rich in antioxi-



dants or anti-inflammatory nutrients, which have a significant role in reducing the risk of adverse birth outcomes," Gete said. "Women depend on certain stored nutrients such as calcium and iron before conception, which are critical for the placenta and foetus tissue development," he added. "Starting a healthier diet after the baby has been conceived may be too late because babies are fully formed by the end of the first trimester," he said. Professor Gita Mishra said the study suggested dietary intervention and strategies change behaviour that may be helpful when women start thinking about having a baby. "People born prematurely face a greater risk of metabolic and chronic diseases in adulthood, as well as poor cognitive development and academic performance," Professor Mishra said.

Premature births, which are births before 37 weeks of gestation, are the leading cause of death in Australian children and affect 8.5 per cent of births each year, a figure which is trending upwards.

Cumulative oral steroid dosages linked to increased hypertension

In a recent study, researchers found that cumulative doses of oral steroids in patients with chronic inflammatory diseases are associated with increased hypertension (blood pressure) for those who take them on a regular basis.

The study was published in the Canadian Medical Association Journal (CMAJ). "The cumulative effect of oral steroid doses on hypertension is substantial, and given that these are commonly prescribed medications, the related health burden could be high," said Dr Mar Pujades-Rodriguez. Hypertension, or high blood pressure, affects one in five adults around the world and can have significant negative health effects. Previous studies have reported a dose-related response between oral steroids and hypertension, although

evidence has been inconclusive. This study of more than 71 000 patients from 389 general practices in England looked at the relationship between oral glucocorticoid doses and hypertension in

Researchers found that in the cohort studied, there were 24,896 (35 per cent) new cases of hypertension. When patients reached cumulative doses, rates of hypertension



patients with chronic inflammatory diseases. The most common underlying diseases included inflammatory bowel disease (35 per cent) and rheumatoid arthritis (28 per cent).

increased accordingly in a dose-response pattern. The authors recommended that health care providers closely monitor blood pressure in patients who routinely take oral steroids.

Researchers develop new tool for performing cancer liquid biopsies

A recent study led by researchers at New York University, Abu Dhabi (NYUAD) has developed a new fluid analyzing platform that allows for the isolation of circulating tumour cells (CTCs), which are formed during metastasis, commonly called stage IV cancer or advanced cancer.

Cancer is one of the leading causes of death worldwide and has been found to have a significantly higher rate of survival when diagnosed at early stages, before metastasis. During metastasis, secondary growth is initiated by circulating tumour cells (CTCs) that shed from the primary tumour into the bloodstream to spread cancer. A team of engineering researchers from NYU Abu Dhabi, led by NYUAD Assistant Professor of Mechanical and Biomedical Engineering Mohammad A. Qasaimeh, has developed a microfluidic platform that is compatible with cutting-edge procedures of atomic force microscopy (AFM). The developed platform is used to capture CTCs from blood samples of prostate cancer patients, followed by AFM mechanical characterizations of CTCs, at the nanoscale, in search for new metastatic mechano-biomarkers.

While the general lifecycle of CTCs is somewhat recognized, the lifespan and interactions of CTCs while circulating in the bloodstream is still unknown. CTCs are very rare and hard to isolate from the background of billions of healthy blood cells, and thus their biological and mechanical phenotypes are still to be explored. The developed

new tool allows for isolation and characterization of CTCs and thus holds the potential to assist in the early detection of cancer. It also can be used as a tool to more effectively track and monitor cancer progression and metastasis. In the paper titled AFM-compatible Micro-fluidic Platform for

characteristics, they can be removed through a liquid biopsy procedure. Isolated CTCs can be potentially used for drug testing and molecular profiling for precision cancer therapies. Far less invasive than a traditional tissue biopsy, liquid biopsy procedures have



the potential to replace traditional tissue biopsies in the near future, and be performed in local clinics or pharmacies. "We expect that this platform could constitute a potentially very powerful tool for cancer diagnosis and prognosis, by identifying CTCs mechanical and biological phenotypes at the single-cell level," said Mohammad A. Qasaimeh.

"With slight customizations, the platform can also be adapted to other types of cancers including breast and lung," said the first author of the study and the Research Scientist of Engineering at NYUAD, Muhammedin Deliorman. The authors hope that using the developed tool, nanomechanical properties of captured CTCs could help in the future to identify aggressive cancer CTCs phenotypes for developing more effective therapies.

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Study links brain function changes to genetic risk in ADHD diagnosis

Genetic studies of attention-deficit hyperactivity disorder (ADHD) show that it takes many common genetic variations combined together in one individual to increase the risk substantially.

At the same time, neuroimaging experts have found differences in how the brains of people diagnosed with ADHD are functionally connected. However, it's unclear how genetic risk might be directly related to altered brain circuitry in individuals diagnosed with ADHD. A new study in Biological Psychiatry: Cognitive Neuroscience and Neuroimaging, published by Elsevier, combined genetics and functional brain imaging to find that both genetic and neural factors influence ADHD diagnosis.

In the study, researchers focused their imaging analyses on selected brain regions, looking specifically at the communication between those regions and the rest of the brain in children with the diagnosis. One region's connectivity was linked to a higher risk of ADHD, while a second, different part of the brain seemed to compensate for genetic effects and reduced the chances of an ADHD diagnosis.

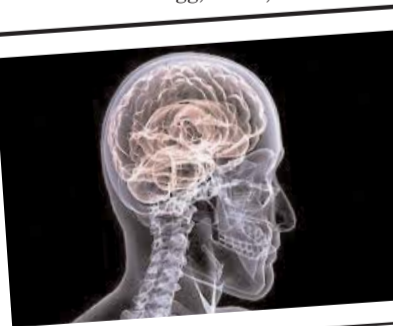
The authors believe this research will lead to a better understanding of how genetic risk factors alter different parts of the brain to change behaviours and why some people at higher genetic risk do not exhibit ADHD symptoms.

"We are now in a phase with enough data to answer some questions about the underlying genetics of a disorder that in the past have been difficult to elucidate," said senior author Damien Fair, PhD.

"Previous imaging studies had shown different functional connectivity, and we assume those have a genetic basis," added Fair.

ADHD is a neurodevelopmental psychiatric disorder that affects about 5 percent of children and adolescents and 2.5 percent of adults worldwide. The disorder is characterized by inattentive or hyperactive symptoms with many variations.

The paper focuses on 315 children between the ages of 8 and 12 who participated in a longitudinal ADHD study that began in 2008 at the Oregon Health & Science University in Portland, WA, USA, as a collaboration between Dr. Fair, a neuroscientist and imaging researcher, and co-author Joel Nigg, PhD, a



pediatric psychologist.

In this study, led by Robert Hermosillo, PhD, a postdoctoral researcher in Fair's lab, the team selected three areas of the brain based on a brain tissue database that showed where ADHD risk genes were likely to alter brain activity. To measure the brain communication to-and-from these regions on each side of the brain, the researchers used resting-state non-invasive magnetic resonance imaging (MRI) scans.

To begin to bridge genetic and neuroimaging studies of ADHD, researchers used MRI to scan the brains of children. Two regions previously associated with ADHD stood out. In one, a higher ADHD genetic

risk correlated with a more active brain circuit anchored by the nucleus accumbens (orange arrow).

Interestingly a weaker connection anchored by the caudate nucleus (blue arrow) seemed to protect children at high genetic risk from ADHD behaviors.

Next, they calculated a cumulative ADHD genetic risk score in the children, based on recent genome-wide studies, including a dozen higher-risk genetic regions reported two years ago by a large international collaboration called the Psychiatric Genetics Consortium.

In one brain region anchored by the nucleus accumbens, they found a direct correlation with genetics. "Increased genetic risk means stronger communication between the visual areas and the reward centers," said Dr. Hermosillo. Another brain region anchored by the caudate yielded more puzzling results until the researchers tested its role as a mediator between genetics and behavior. "The less these two regions talk to each other, the higher the genetic risk for ADHD," said Dr. Hermosillo.

"It seems to provide a certain resiliency against the genetic effects of ADHD. Even among those with high risk for ADHD, if these two brain regions are communicating very little, a child is unlikely to end up with that diagnosis," Hermosillo added. A third region, the amygdala, showed no correlation between connectivity to the other brain regions and genetics. According to the authors, the findings suggest that a genetic score alone will not be enough to predict ADHD risk in individuals because the results show both a genetic and neural contribution toward an ADHD diagnosis. A future diagnostic tool will likely need to combine genetics and brain functional measures.

Scientists find structural protein that may be new marker of depression

A structural protein has been zeroed on by scientists as a new target for the diagnosis and treatment of depression, suggests a recent study. The research was published in the Journal of Neuroscience. The protein tubulin provides structure to cells and assists in many cellular processes, but it also plays a role in depression. A modified form of tubulin anchors the protein Gas to lipid rafts, fatty structures floating in the cell membrane. In depressed people, Gas gets stuck in lipid rafts and cannot trigger the production of cAMP, a molecule necessary for quick messaging in the brain. Imaging studies have shown that people with depression have less cAMP in their brains, which is remedied after successful treatment.

Other studies examined the amount of modified tubulin in the brains from people who were not depressed as well as those from people with depression who died by suicide and by other causes. All brains contained the same amount of modified tubulin, but the brains of people with depression had less modified tubulin in the lipid rafts. This could allow more tubulin to trap Gas in the lipid rafts, preventing cAMP production.