

## How does music therapy work? Brain study sheds light



**ISLAMABAD:** Music therapy works, but no one is really sure how. Now, a novel type of brain scan may provide key insight. Music is a powerful thing. In fact, it forms the basis of a type of therapy, the aptly named "music therapy." During sessions, a music therapist attempts to form a bond with their client in order to enhance well-being and improve confidence, communication skills, awareness, and attention. There are several types of music therapy. Some involve simply listening to relaxing music while talking. Others involve making music with instruments, which can be particularly effective for those who struggle to communicate verbally. One type, known as the Bonny Method of Guided Imagery and Music (GIM) aims to facilitate discussion. The therapist plays music and asks the client to describe the images that come to mind.

Trials have found benefits to music therapy, but how it works remains unclear. Using GIM as their focus, a team led by two experts from Anglia Ruskin University, in the United Kingdom — Prof. Jörg Fachner and Clemens Maidhof, Ph.D. — set out to find the answer. Their findings appear in the journal *Frontiers in Psychology*. The goal of a music therapist is to reach a "moment of change" in which they can strengthen their connection with their client. Therapists and clients often describe feeling in sync, and now there is evidence to prove it.

In the current study, the researchers used hyperscanning — a procedure that can simultaneously record two people's brain activities — to study a music therapist's session with a client. The method, says lead author Prof. Fachner, "can show the tiny, otherwise imperceptible, changes that take place during therapy."

The therapist and client wore EEG caps to record the electrical signaling in their brains, and the session was filmed. Ultimately, the researchers hoped to learn more about how the individuals interacted. "Music, used therapeutically, can improve well-being and treat conditions including anxiety, depression, autism, and dementia. Music therapists have had to rely on the patient's response to judge whether this is working, but by using hyperscanning we can see exactly what is happening in the patient's brain," says Prof. Fachner. Once the recordings were complete, the researchers asked the therapist, client, and two other GIM therapy experts to watch the video and each note down three moments of change, as well as one unimportant moment. The team examined their answers for overlap to see whether any points were of interest to all four participants. A couple of moments fell into this category. With that knowledge, Prof. Fachner and Maidhof examined the EEG readings from those moments. They paid particular attention to the areas of the brain that process positive and negative emotions. Surprisingly, they came up with an image that illustrates a moment of change inside the brain.

When the client's brain switched from negative emotions to positive ones, their EEG recording clearly showed this. A few moments later, the therapist's brain showed the exact same pattern. Both the therapist and client later identified this moment as a point when they felt that the session was working. Not only were their thoughts in sync, but their brain activity, too. The researchers also noted increased activity in both participants' visual cortex during these moments of change. It is unlikely that other case studies will provide the exact same results, due to the personalized nature of therapy. But more research will need to go into therapist-client relationships before the synchronicity can be confirmed. Still, Prof. Fachner described the study as "a milestone in music therapy research." "Music therapists report experiencing emotional changes and connections during therapy, and we've been able to confirm this using data from the brain," Prof. Jörg Fachner. He adds that the study has further implications than just proving a point. He explains, "By highlighting the precise points where sessions have worked best, it could be particularly useful when treating patients for whom verbal communication is challenging." The findings could also make music therapy more effective by exposing when and how a therapist should intervene for maximum efficacy. And, as Prof. Fachner notes, studies such as this may "help [researchers] better understand emotional processing in other therapeutic interactions." —Online

## COVID-19: Multisystem inflammatory syndrome affects Black, Latino kids most

**S**ymptoms of MIS-C include inflammation of various organs, which can be fatal. However, treatments are available. A study from a Washington, D.C., hospital finds that MIS-C disproportionately affects Black and Latino children. Much remains to be learned about MIS-C, including the best way to treat it. Multisystem inflammatory syndrome in children (MIS-C) Trusted Source is one of the most severe and mystifying threats associated with SARS-CoV-2 infections. This potentially life-threatening condition primarily affects people under 21 years.

It is characterized by the inflammation of the heart, lungs, brain, kidneys, eyes, skin, or gastrointestinal organs. Although MIS-C can be successfully treated if detected early enough, it is a disease of exclusion, making diagnosis difficult.

Although children with MIS-C test positive for a current or recent SARS-CoV-2 infection, they may

be asymptomatic, with no outward sign that infection has even occurred. The Centers for Disease Control and Prevention (CDC) Trusted Source report that 3,724 children in the United States have been diagnosed with MIS-C as of May 2021. The study found that heart complications, including systolic myocardial dysfunction and valvular regurgitation, frequently occurred in children critically ill with MIS-C. Stay informed with live updates on the current Covid-19 outbreak and visit our coronavirus hub for more advice on prevention and treatment. A study from Children's National Hospital in Washington, D.C., finds that MIS-C disproportionately affects Black and Latino children, with Black children at significantly greater risk of MIS-C. With this research, the study's authors hoped to develop a clearer picture of the impact of MIS-C and to help identify patterns that could promote early detection and successful treatment.

## Cigarette smoke increases superbug's antibiotic resist-

**ISLAMABAD:** New research analyzes the effect of cigarette smoke on MRSA strains and finds that it makes the bacteria more persistent, more invasive, and more resistant to certain antibiotics. Smoking is the leading cause of preventable death across the world, with tobacco use, including smoking, being responsible for over 7 million fatalities each year. In the United States, over 16 million people have a smoking related condition, and tobacco smoking causes 1 in 5 deaths each year. Researchers and healthcare professionals know that smoking impairs a person's immune system and the defenses against infections. However, they do not know much about how cigarette smoke affects microbes that live in the nasopharyngeal cavity, in particular.

A new study aims to remedy this gap in research by examining the effect of cigarette smoke on *Staphylococcus aureus* (S. aureus).

Maisem Laabei, from the Department of Biology & Biochemistry at the University of Bath in the United Kingdom, is the lead author of the new research, which appears in the journal *Scientific Reports*. Dr. Laabei explains the motivation for the research, saying, "We wanted to study S. aureus because it's so common in humans and it can cause a range of diseases, so we wanted to see what happened when we exposed it to smoke." S. aureus is part of the nasal microflora of 30-60% of people. The pathogen can cause various infections that can range from minor, such as superficial skin infections, to very severe and potentially fatal, such as pneumonia or endocarditis. Antibiotic resistant strains of S. aureus are a significant contributor to the microbial resistance public health crisis. Methicillin-resistant S. aureus (MRSA) specifically, causes 94,360 invasive



infections each year in the U.S., and about 18,650 people die as a result.

MRSA is a "clonal pathogen," explain the researchers, and several studies have singled out a few "predominant clones that are responsible for the majority of the global prevalence of MRSA and subsequent disease burden." In the new study, Dr. Laabei and colleagues exposed six of the most common strains of MRSA "superbug" clones. They chose the strains based on their clinical relevance and genetic diversity.

Not all strains reacted in the same way to cigarette smoke, but some became more resistant to the antibiotic rifampicin, as well as becoming more invasive, more persistent, and forming more biofilm. "We expected some effects, but we didn't anticipate smoke would affect drug resistance to this degree," comments Laabei. The researchers put the findings down to the appearance of so-called small colony variants (SCVs) — a "slow-growing subpopulation of bacteria" that adapt to harsher conditions, making them more challenging for doctors to treat. Previous research, explain the scientists, has

linked SCVs to smoking related chronic infections. In the new study, the authors note, "Mutational analysis revealed that" cigarette smoke caused SCVs to "emerge via the SOS response DNA mutagenic repair system." In other words, cigarette smoke stresses S. aureus, causing it to react by mutating its DNA at a much faster pace than normal. This causes SCVs to emerge. "These [SCVs] are highly adhesive, invasive, and persistent," explains Laabei. "They can sit around for a long time, are difficult to kick out, and are linked to chronic infections." "We hope that our work provides another reason for people not to smoke and for current smokers to quit," Maisem Laabei "We recognize that exposure in a lab is different to inhaled smoke over a long time," continues the lead researcher, "but it seems reasonable to hypothesize, based on our research and others' that stressful conditions imposed by smoking induce responses in microbial cells leading to adaptation to harsh conditions, with the net effect of increasing virulence and/or potential for infection." —Online

## Fried foods, sugary drinks linked to sudden cardiac death



**I**n the present study, researchers found that people who followed the Mediterranean diet most closely and did not have coronary heart disease had a lower risk of sudden cardiac death.

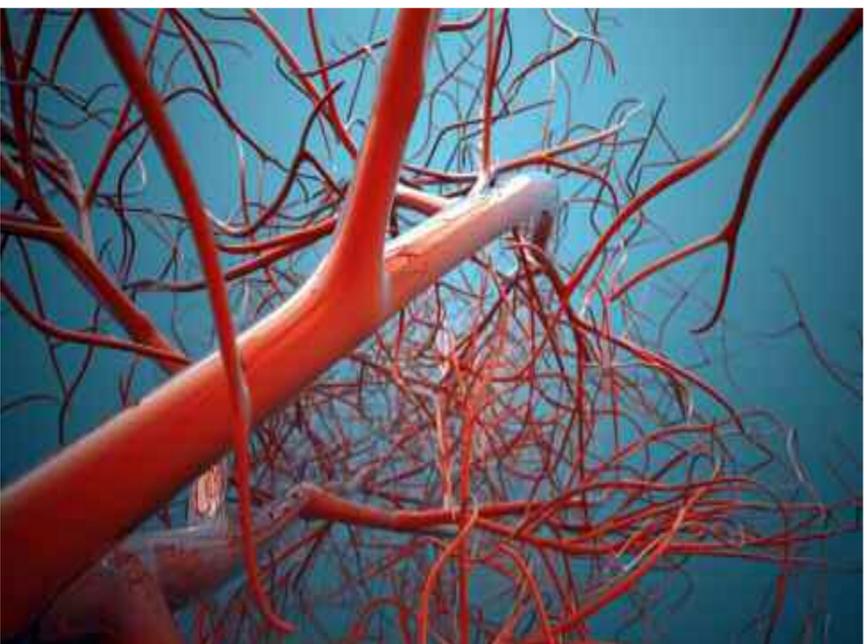
People who primarily ate a traditional Southern diet, involving more fried food and sugary drinks, were more at risk of sudden cardiac death. In a new study, researchers have found a positive association between the Southern diet — which involves more fried food and sugary drinks — and sudden cardiac death. They also linked the Mediterranean diet to a reduced risk of sudden cardiac death. The research, which appears in the *Journal of the American Heart Association*, offers further evidence of the importance of diet to cardiovascular health.

Death certificates show that sudden cardiac death is a factor in 1 in 7.5 deaths in the United States. A key un-

derlying cause is coronary heart disease. According to the Office of Disease Prevention and Health Promotion (ODPHP)Trusted Source, a person can improve their heart health by changing their diet. The ODPHP suggests that people eat a variety of fruit and vegetables, low fat dairy, whole grains, a variety of proteins, and unsaturated fats. Research has shown that the Mediterranean diet, which focuses on legumes, vegetables, fruits, fish, and grains, can be protective against cardiovascular disease.

Researchers have also identified an inverse link between the Mediterranean diet and sudden cardiac death. However, the study had significant limitations, as it included a hugely disproportionate number of white participants and focused primarily on women. In the present study, the researchers drew on data from the Reasons for Geographic and Racial Differences in Stroke Study

## Three higher iron levels may protect arteries but raise clot risk



**ISLAMABAD:** Having higher natural levels of iron could be both good and bad for cardiovascular health, according to new research. On one hand, it may lower the risk of clogged arteries, but on the other hand, it may raise the risk of blood clots related to reduced flow.

These were the conclusions of a large study that examined the relationship between people's natural iron levels and three measures of cardiovascular disease: carotid artery wall thickness, deep vein thrombosis (DVT), and carotid artery plaque.

Thickening of the vessel wall and the buildup of plaque in the carotid artery are both signs of atherosclerosis. DVT occurs when a blood clot, or thrombus, forms in a deep vein. DVT typically affects the leg.

The researchers found that having higher levels of iron appears to raise the risk of DVT yet reduce the risk of carotid plaque. There was "no significant effect" on carotid artery wall thickness. "These results," write the authors, "are consistent with previous studies that suggest higher iron status has a protective role in atherosclerosis but increases the risk of

thrombosis related to stasis of blood." Genetic markers of iron status

The study is one of a series that scientists from Imperial College London in the United Kingdom are leading. In these studies, international teams are using genetic data from 500,000 people to explore links between iron levels and more than 900 conditions. The researchers are using a tool called Mendelian randomization (MR) to investigate links between people's natural iron levels and disease risk. By searching DNA data on nearly 49,000 people of European descent, they found genetic markers that correlate with higher natural levels of iron.

The researchers then used the DNA iron level markers to screen other datasets of tens of thousands of people to find links to carotid artery wall thickness, DVT, and carotid artery plaque. "Contrasting role" of iron status. Atherosclerosis is a major worldwide cause of conditions that affect blood vessels. It can give rise to heart disease, stroke, and peripheral artery disease. The process of atherosclerosis begins when cholesterol and other

fatty materials deposit in artery walls and develop into atheromas. These can eventually rupture and lead to a local clot.

The clot can partially or completely restrict blood flow and cause a stroke or heart attack, depending on which artery it affects. The researchers suggest that their findings provide evidence of a "contrasting role" of higher natural iron levels on "different thrombotic disease processes." Speculating on the implications of these findings, lead and corresponding author Dr. Dipender Gill — of the School of Public Health at Imperial College London — suggests that they open new avenues for further studies. These could address many unanswered questions, such as how iron affects cholesterol, influences the formation of blood clots, and promotes artery narrowing. The new study, like others in the series, only investigated people's natural levels of iron using their genetic markers. It did not investigate the effect of taking iron supplements. Dr. Gill also says that people should speak to their doctor before they start to take or stop taking iron supplements. —Online