

**UN-DOCTORED**  
HOW TO CARE FOR YOUR SKIN

**DIETS**  
FAD, NOT FAB

**MEDTALK**  
GUARDING AGAINST FLESH-EATING BACTERIA

**THEWEEK**

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JULY 7, 2024

# health

## MAKING DRUGS, AIDED BY AI

Indian companies are using artificial intelligence to make faster and cheaper drugs

**EXCLUSIVE**

**DANISH SCIENTIST  
MORTEN MELDAL**  
on his Nobel-winning  
'click chemistry'

**ARINDAM SEN  
OF HEARTNET**  
on AI's role in early  
detection of  
heart ailments





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SHUTTERSTOCK/AI

## BOOSTER SHOT

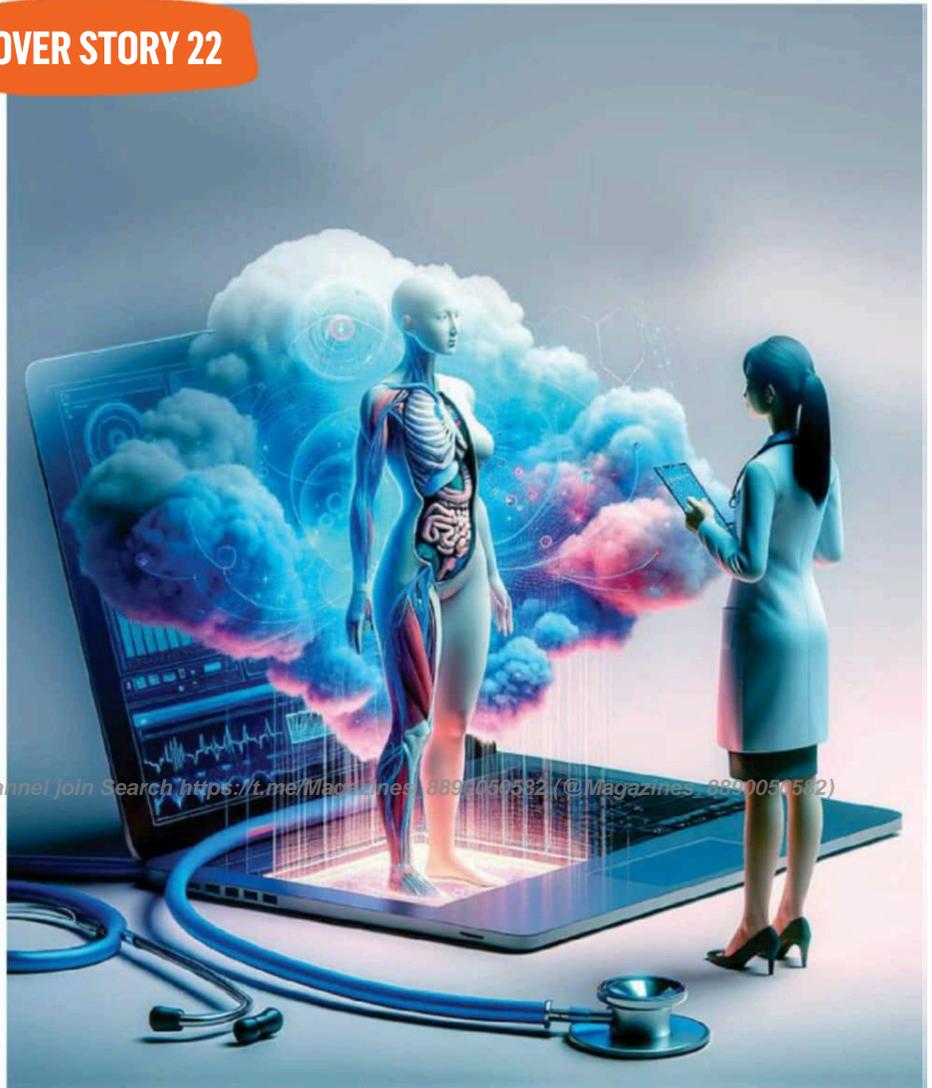
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According to market research, the global market for AI in drug discovery is estimated to reach \$4.9 billion by 2028, showing a substantial increase from \$0.9 billion in 2023. Indian companies are part of this wave, using AI to develop faster and cheaper medicines to treat rare diseases, cancer, diabetes and more

#### PLUS

Click chemistry is like making small molecular robots out of building blocks, says Morten Meldal, Danish Nobel laureate

AI can be used to detect as well as manage heart conditions, says Arindam Sen, director, Heartnet India Pvt Ltd



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### UN-DOCTORED

Tips on how to care for your skin—balanced diet, no smoking and more



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### DIETS

Stay away from these seven fads, including detox teas, volume eating and juice cleanses

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#### LAYOUT

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# letters



## Healthier lifestyle

Creating awareness and access to timely treatment can prevent stroke to some extent. Regular exercise and time-restrictions on eating can also fend off stroke ('Stroke of genius?', June 2).

Everyone knows that high blood pressure and smoking can significantly increase the risk of stroke. So, we should look at natural ways to lower our blood pressure. Fostering healthier lifestyles, after all, can create wonders.

Here, one must admit that traditional medical systems have also played an important role in stroke prevention and recovery. All of us should engage in some kind of physical activity for at least 30 minutes every day.

**K.V. PRASAD,**

ON EMAIL.

It is a myth that stroke strikes older people or people above age 60. Even young people are at risk of stroke. Obesity, in many ways, increases risk of a stroke. This is mostly due to inflammation caused by excessive fatty tissue in the body, which causes poor blood flow in the body and possible

blockage. Exercise is the only natural stroke reducer. It helps us lose weight and lowers blood pressure.

People should not ignore warning signs like sudden weakness in the limbs and difficulty in speaking as these could be indications of a stroke. I read somewhere that

stroke patients in India are younger than their western counterparts, and that worries me a lot.

If it is possible, let us all strive to be non-smoking teetotalers and live a long life sans worries.

**TAPESH KOTHARI,**

ON EMAIL.

## Curb anger

I enjoy going through your Quickscan items. Anger can cause stress and negatively affect the body and health (June 2). We are less likely to make good judgements in an anxious state of mind. So why get angry in the first place? Meditation is a good way of curbing temper. I have noticed that I get angry and irritable when I am sleepy. Hence, I feel a full night's sleep is must towards managing anger.

**AKANKSHA MONGIA,**

ON EMAIL.

## Take the stairs

Research has shown that climbing stairs may reduce the risk of heart disease. In fact, climbing seven flights of stairs each day could reduce the risk of heart disease by around 30 per cent. So, why not go for it! It is highly recommended ('Quickscan', June 2). Like they say, there is no elevator to success. Take the trouble to take the stairs.

**TIGIN THOMAS,**

ON EMAIL.

## Strong bones

I get the point that people are pumping huge amounts



## State of mind?

I feel there is nothing wrong in being lonely ('Quickscan', June 2). Being lonely isn't as bad as one imagines it to be. It is completely okay to feel lonely.

The best in you comes out when you are alone. We should savour those few hours of solitude that we get. It brings peace of mind.

There are people that I know who have lots of social contact and support and yet feel lonely. Which, then, makes me wonder whether loneliness is only a state of mind. Loneliness, mind you, is the only truth of life.

**AMMU NARAYAN,**

ON EMAIL.

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of weight but the body is not used to the sudden increase in the musculature of the heart. But, then, we were always told to build muscles, and, in the process, look fit and healthy. Brisk walking and other forms of exercise are important but excess of anything is bad ('Bone supremacy', June 2). Keeping our bones strong as we get older is important. All of us, after the age of 50, should consume calcium supplements as that lessens the risk of getting affected by osteoporosis. Bone loss is dangerous as that can lead to fractures.

**VRINDA GOPI,**

ON EMAIL.



## Stop stigmatising them

The journey of Sarika A.K., the 23-year-old who cleared the UPSC exam while battling cerebral palsy, was inspiring ('Winner in a wheelchair', June 2). We should stop stigmatising differently-abled people. They have all the rights that we have. We should constantly encourage them to conquer the world.

I hope many more differently-abled people clear competitive with flying colours.

**TANUSHRI VERMA,**

ON EMAIL.



# MEDTALK



BY NIRMAL JOVIAL



## Guard against flesh-eating bacteria

**O**n June 18, Japan's National Institute of Infectious Diseases (NIID) reported a spike in the number of 'flesh-eating bacterial infections' in the country. As of June 9, the preliminary number of cases of Streptococcal Toxic Shock Syndrome (STSS) since the beginning of this year reached 1,019. A patient infected with Group A Streptococcus (GAS) bacteria could develop STSS, which can lead to flesh-eating bacterial infections, also known as necrotising fasciitis. This year has seen a significant increase in the spread of this rare and severe bacterial infection.

The mortality rate for necrotising fasciitis is 30 per cent. The bacteria can enter the body through surgical wounds, puncture wounds, burns, and minor cuts and scrapes. Early symptoms include redness, swelling, pain, blisters, fever, nausea, and vomiting. The infection progresses rapidly, leading to tissue death and causing severe pain, discolouration and peeling of the skin.

Flesh-eating bacterial infections have been documented for centuries, with some notable cases and outbreaks. Joseph Jones, a Confederate Army surgeon during the American Civil War, is credited with providing one of the first modern descriptions of necrotising fasciitis. He described it as "hospital gangrene", a condition characterised by rapid and progressive soft

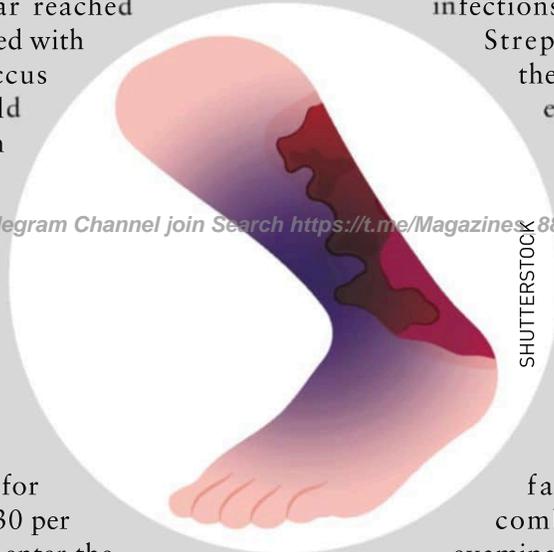
tissue infection caused by Group A beta-hemolytic streptococcus, now recognised as necrotising fasciitis.

The term 'flesh-eating bacterial infections' is relatively new, coined and popularised by British tabloids towards the end of the 20th century to describe the necrotising infections caused by Group A

Streptococci. Back then, the media suggested that epidemics of streptococcal infection were imminent. Scholars, however, note that such aggrandisement was unfounded. The moniker, though, helped in heightening public awareness of this infectious disease.

Diagnosing necrotising fasciitis involves a combination of physical examination, blood tests, tissue biopsy and imaging tests such as CT scans. Serious complications may lead to sepsis shock, organ failure, amputation and death. The infection can also cause severe scarring and long-term disability. Prompt and aggressive treatment is crucial, as necrotising fasciitis can rapidly progress and become life-threatening.

Treatment protocols include intravenous antibiotics, surgery to remove infected tissue, and other medications to manage complications such as sepsis and shock. Patients with underlying conditions like diabetes, immunosuppression, and chronic alcohol use are at higher risk and may require more aggressive management.



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# DO TATTOOS INCREASE CANCER RISK?

**A** Swedish study published in the journal *eClinical Medicine* suggests that tattoo ink can increase the risk of lymphoma, a type of cancer that involves the lymph nodes.

Researchers compared the answers to a questionnaire about lifestyle factors filled out by 1,398 adults who had developed lymphoma between the ages of 20 and 60 and 4,193 adults without lymphoma.

In the lymphoma group, 21 per cent were tattooed compared with 18 per cent in the group without a lymphoma diagnosis. Those who were tattooed had a 21 per cent increased risk of developing malignant lymphoma after accounting for age, smoking and other relevant factors.

Surprisingly, the size of the tattoo did not matter. "We do not yet know why this was the case," the lead researcher said. "One can only speculate that a tattoo, regardless of size, triggers a low-grade inflammation in the body, which, in turn, can trigger cancer."

"We already know that when the tattoo ink is injected into the skin, the body interprets this as something foreign that should not be there and the immune system is activated. A large part of the ink is transported away from the skin to the lymph nodes where it is deposited."

Most people get their first tattoo when they are young, and they are exposed to tattoo ink for a large part of their lives.



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PHOTOS: SHUTTERSTOCK

## OPTIMAL 24-HOUR ACTIVITY CYCLE EXPLAINED

**HOW MANY HOURS SHOULD YOU SIT,** stand, sleep and exercise in a day for optimal cardiometabolic health and glycemic control?

To find out, an international team of researchers analysed the behaviour of 2,388 participants aged 40–75 years—48.7 per cent of them women—within a 24-hour period.

According to the findings published in the journal *Diabetologia*, the ideal daily balance is six hours of sitting; five hours and 10 minutes of standing; eight hours and 20 minutes of sleeping; two hours and 10 minutes of light-intensity physical activity; and two hours and 10 minutes of moderate-to-vigorous intensity physical activity.

Light-intensity physical activity include daily chores and

housework, while moderate-to-vigorous physical activity involves a brisk walk, jogging or gym workout. Replacing sitting time with more physical activity was associated with greater glycemic control, especially in those with type 2 diabetes.

“This breakdown encompasses a wide range of health markers and converges on the 24 hours associated with overall optimal health,” the leader of the study said.

“Moving as much as you can is always encouraged when so much of life requires us to be sitting in front of screens. Shorter sitting time and more time spent standing, undergoing physical activity and sleeping will boost our cardiometabolic health.”

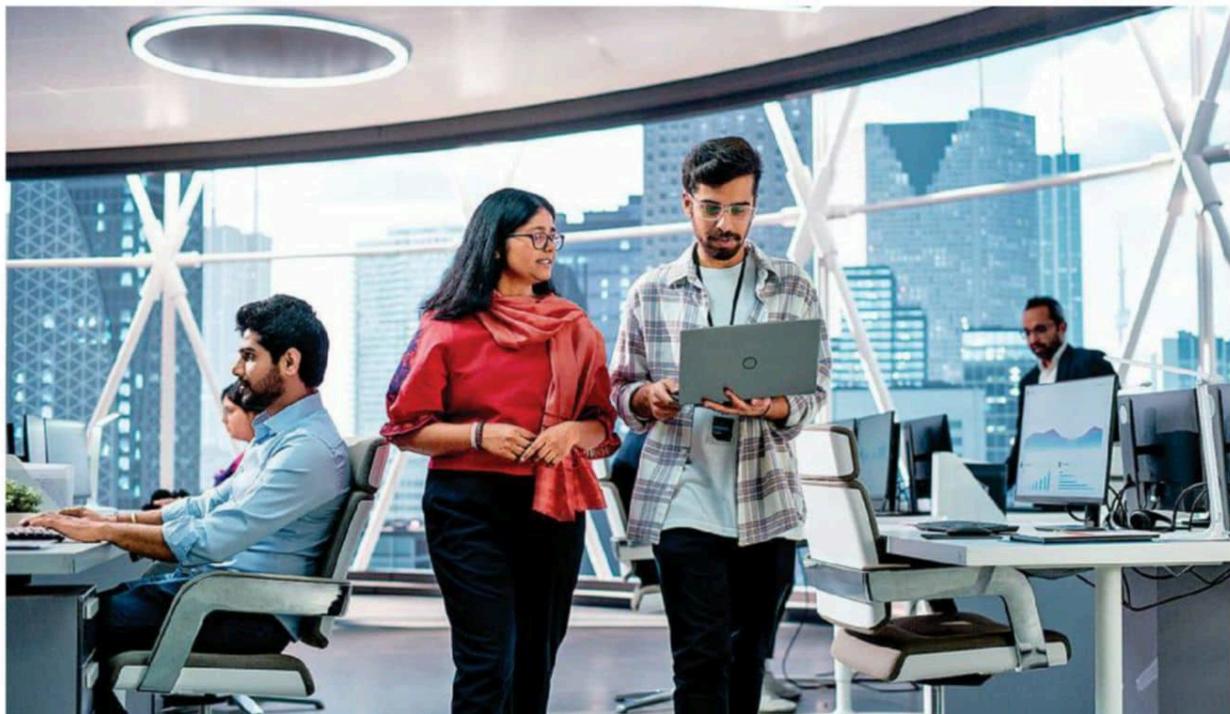


**Did you know?**

Bicyclists are 17 per cent less likely to have knee pain and 21 per cent less likely to have symptoms of knee arthritis, compared with non-bicyclers.

**Medicine & Science in Sports & Exercise**

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## C-SECTION BABIES NEED TWO DOSES OF MEASLES VACCINE

**BABIES BORN BY C-SECTION** need two doses of the measles vaccine for optimal protection against the disease. A single dose of the vaccine is up to 2.6 times more likely to be completely ineffective in C-section babies, compared with those born vaginally.

Measles is a highly contagious disease spread by coughs and sneezes. It starts out with cold-like symptoms and a rash, and can lead to severe complications like blindness, seizures and death. Before the introduction of measles vaccine in 1963, major measles epidemics caused an estimated 2.6 million deaths each year.

For the study published in *Nature Microbiology*, researchers used data from previous studies of 1,505 children in China whose blood samples were taken every few weeks from birth to age 12. About 12 per cent of children born via C-section had no immune response

to their first measles vaccination, compared to 5 per cent of children born vaginally.

The findings emphasise the importance of giving two doses of the vaccine for a long-lasting immune response. A possible reason is the development of the infant's gut microbiome. "With a C-section birth, children are not exposed to the mother's microbiome in the same way as with a vaginal birth," the lead researcher explained. "We think this means they take longer to catch up in developing their gut microbiome, and with it, the ability of the immune system to be primed by vaccines against diseases including measles."

Only 83 per cent children had received one dose of measles vaccine by their first birthday in 2022, according to the WHO, and a lot of children don't get their second measles jab. "Vaccine hesitancy is really problematic, and measles is top of the list of diseases we are worried about because it's so infectious," said the study. At least 95 per cent of the children need to be fully vaccinated to keep measles under control.

## ARE FISH OIL SUPPLEMENTS GOOD FOR THE HEART?

**A NEW STUDY THAT ASSESSED** the benefits of fish oil supplements has yielded mixed results.

Regular use of fish oil supplements could increase the risk of first-time heart disease and stroke among those in good cardiovascular health. However, for those with heart problems the supplement may slow progression of the disease and lower the risk of death, according to a long-term study published in *BMJ Medicine*.

A rich source of omega 3

fatty acids, fish oil is often recommended for good heart health. To find out the associations between fish oil supplements and new cases of atrial fibrillation; heart attack, stroke, and heart failure; and death from any cause in those with no known cardiovascular disease, the researchers used data from 4,15,737 participants aged 40–69, nearly 55 per cent of them women.

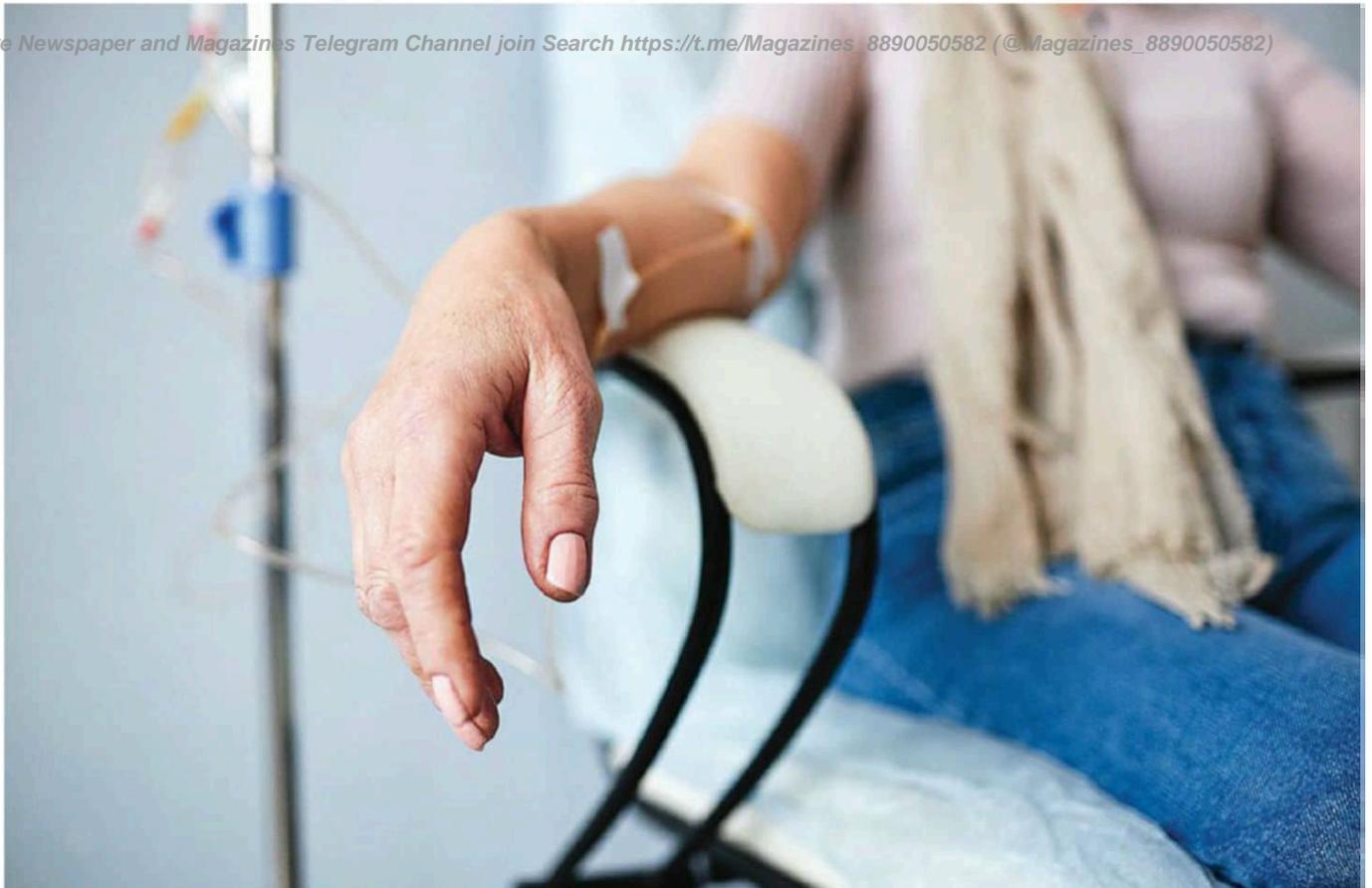
About 32 per cent of them regularly used fish oil

supplements.

The research team then tracked the health of participants for an average of nearly 12 years, watching to see how many died, developed heart problems or suffered a stroke. During an average follow up of nearly 12 years, 18,367 participants developed atrial fibrillation, 22,636 had a heart attack/stroke or developed heart failure, and 22,140 died, of whom 14,902 did not have any previous heart issues.

For healthy adults, regular use of fish oil supplements was associated with a 13 per cent

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increased risk of atrial fibrillation and a five per cent increased risk of stroke. The increased risk was six per cent higher in women and in non-smokers.

But for those who already had heart issues, regular use of fish oil supplements was associated with a 15 per cent lower risk of progressing from atrial fibrillation to a heart attack, and a nine per cent lower risk of progressing from heart failure to death.

"Regular use of fish oil supplements might have different roles in the progression of cardiovascular disease," the study concluded.

## MOST CANCER TREATMENTS NEAR END OF LIFE NOT BENEFICIAL

**SYSTEMIC THERAPIES** do not improve survival in patients with very advanced solid tumours near the end of life, according to a US study published in *JAMA Oncology*. To find out if those with advanced disease who received systemic treatments, such as immunotherapies, targeted therapies or hormonal therapies had better survival, the researchers analysed records on 78,446 adult cancer patients, average age 67.3 years, treated at 144 US cancer clinics. The patients had metastatic and advanced tumours in six common

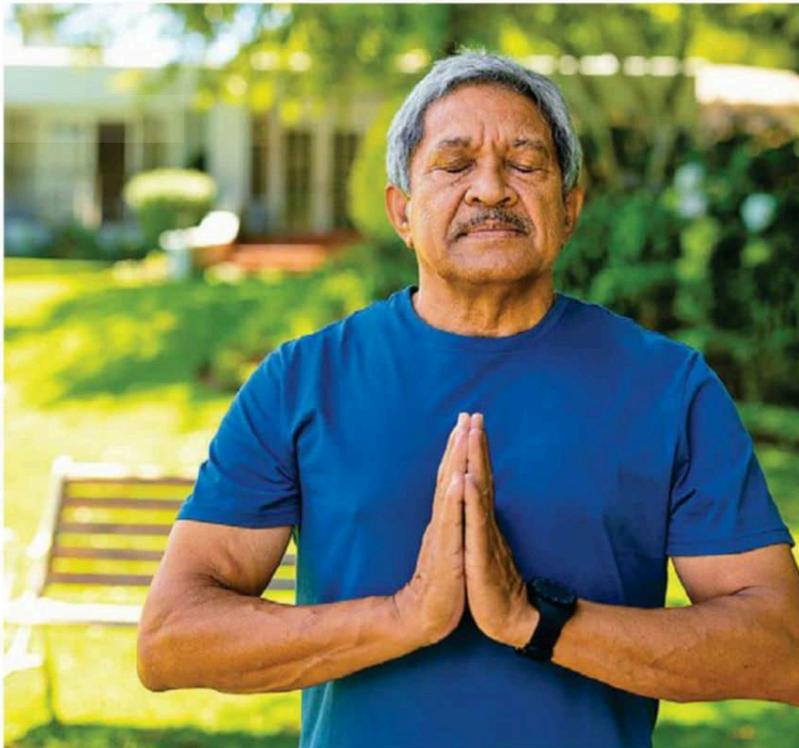
cancers—breast, colorectal, non-small cell lung, pancreas, kidney and urothelial. The findings showed no statistically significant survival benefit for patients treated with systemic therapies, compared with those who did not receive such treatments. Also, this was relevant across all the cancer types studied. "We hope this information can help inform oncologists when they are deciding whether or not to continue treatment or transition patients who have metastatic disease to supportive care," the study author said.



### Did you know?

Internet addiction can disrupt brain networks in adolescents and lead to more addictive behaviour and tendencies as well as behavioural changes linked to intellectual ability, physical coordination and mental health and development.

**PLOS Mental Health**



## CAN LIFESTYLE CHANGES SLOW ALZHEIMER'S DISEASE?

### ACCORDING TO NEW RESEARCH

published in the journal *Alzheimer's Research and Therapy*, adopting certain healthy lifestyle habits can significantly improve brain function in patients with mild cognitive impairment or early dementia due to Alzheimer's disease.

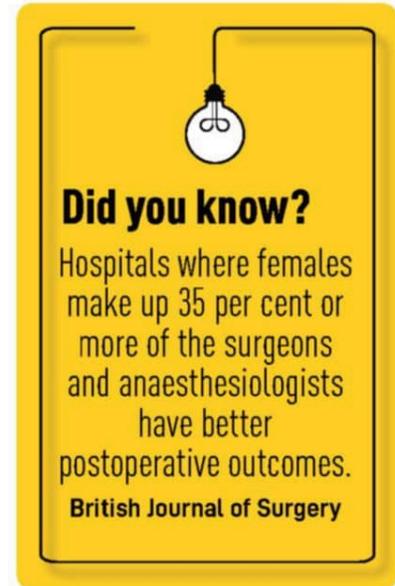
This is the first time that a sustained lifestyle intervention, without drugs, has shown to have an impact on the progression of Alzheimer's.

For the study, 51 people between 45 and 90 years, with a diagnosis of mild cognitive impairment or early dementia due to Alzheimer's disease, were randomly assigned to either an intensive lifestyle intervention group or a control group. Those

in the control group were asked not to make any lifestyle changes during the 20-week trial.

The lifestyle group participated in an intensive programme with four components: (1) a whole-foods, minimally processed plant-based diet low in harmful fats, refined carbohydrates, alcohol and sweeteners (mostly fruits, vegetables, whole grains and legumes); (2) moderate aerobic exercise and strength training for at least 30 minutes per day; (3) stress management, including meditation, stretching, breathing and imagery, for one hour per day; and (4) support groups for patients and their spouses for one hour, three times a week.

Results after 20 weeks showed significant improvements in



cognition and function as well as in several key blood-based biomarkers among the intervention group versus the control group. In contrast, patients in the control group showed overall worsening in all four measures of cognition and function.

Measure of amyloid protein, which builds up in the brains of Alzheimer's patients, improved in the lifestyle group, but worsened in the control group. Also, the gut microbiome of the lifestyle group showed a significant decrease in organisms that raise the risk of Alzheimer's disease and an increase in organisms that are protective against Alzheimer's disease. The more closely these patients followed the lifestyle habits, the greater the beneficial impact on cognition and function.

Several patients in the intervention group reported being able to read again which they had been unable to do because they could not follow story lines and retain information.

## DRINKING ON FLIGHTS BAD FOR YOUR HEART

**DRINKING ALCOHOL DURING A FLIGHT**, combined with cabin pressure at cruising altitude, may threaten a sleeping passenger's heart health, especially on long-haul flights, suggests a German study published in the journal *Thorax*.

Blood oxygen levels can drop to around 90 per cent at cruising altitude, even in young and healthy adults. Anything lower than that is considered hypobaric hypoxia, or low blood oxygen levels at high altitude. Alcohol is already known to relax blood vessel walls and increase heart rate during sleep, an effect similar to that of hypobaric hypoxia.

To study the impact of alcohol plus cabin pressure, researchers recruited 48 people aged 18 to 40. Half of them were assigned

to a sleep lab under normal air pressure and half to an altitude chamber that mimicked cabin pressure at cruising altitude.

From each group, 12 members were asked to drink vodka that roughly equaled two cans of beer or two glasses of wine before they slept. The participants' sleep cycle, oxygen levels and heart rate were continuously monitored.

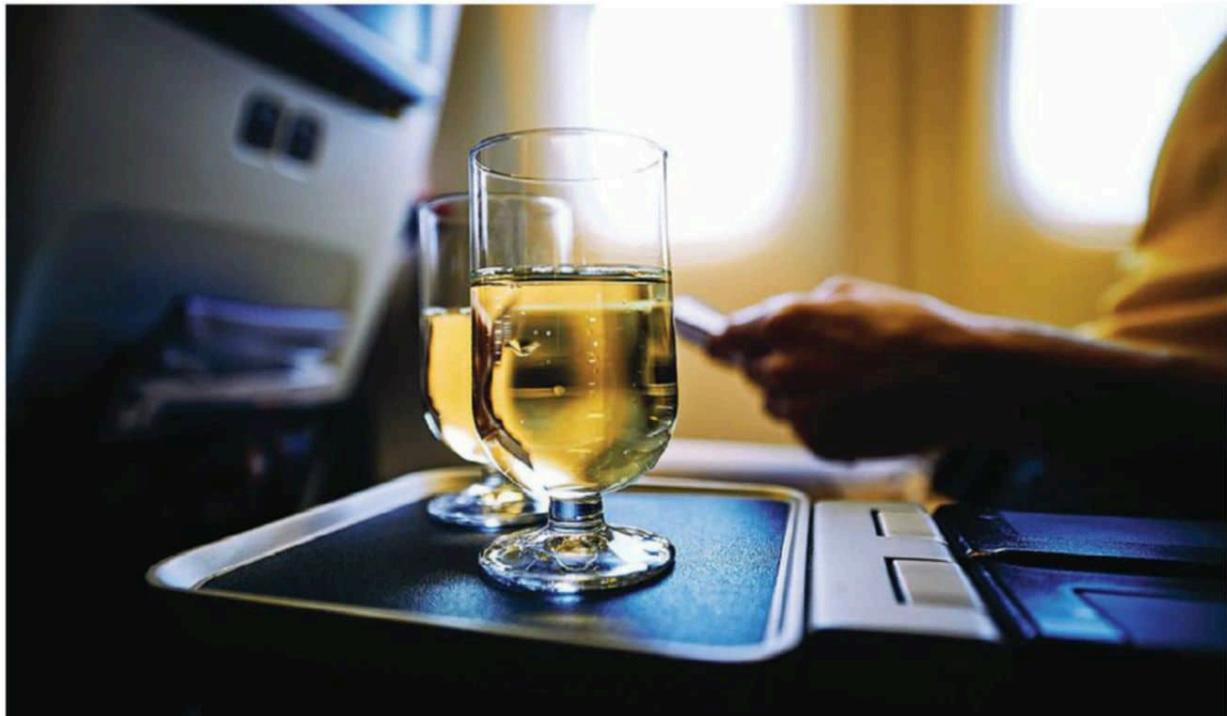
The blood oxygen levels of those who drank and slept in the altitude chamber fell to about 85 per cent, and their heart rate increased to an average 88 beats per minute. That was considerably worse than the non-drinkers in the altitude chamber and the participants in the sleep lab. Oxygen levels below the healthy norm lasted for more than three hours with alcohol consumption

and cabin pressure.

Higher alcohol consumption could further increase the observed effects, especially among older adults and those with pre-existing medical conditions such as cardiac or pulmonary disease. Sleep quality was also worse for the alcohol and altitude combo group, suggesting that inflight alcohol consumption may not provide a restful sleep as travellers think.

"Cardiovascular symptoms have a prevalence of 7 per cent of inflight medical emergencies, with cardiac arrest causing 58 per cent of aircraft diversions," the authors wrote.

The researchers suggest that it would be wise to restrict access to alcohol, especially on long haul flights.





## GLOWING DYE HELPS SURGEONS REMOVE HIDDEN PROSTATE CANCER CELLS

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**A SPECIAL TYPE OF GLOWING MARKER DYE** could help surgeons identify and remove prostate cancer cells, even those not visible to the naked eye, in real-time, according to new study findings published in the *European Journal of Nuclear Medicine and Molecular Imaging*.

The new technique was tried on 23 men with prostate cancer who were injected with the fluorescent dye attached to a special marker molecule before undergoing robot-assisted surgery to remove the prostate. The dye found areas of cancerous tissue

not picked up by the naked eye or other clinical methods. The dye works by sticking to a protein found on the surface of prostate cancer cells. An imaging system that shines a special type of light on the prostate and nearby areas to make the prostate cancer cells glow was used by the surgeons. The dye helped the surgeons identify and remove all cancerous tissues, even those that had spread from the tumour into nearby pelvic tissues and lymph nodes, thus significantly reducing the possibility of cancer coming back. The technique also helps

preserve healthy tissues which meant fewer surgery related life-changing side effects like incontinence and erectile dysfunction. This marker dye could also be used for other types of cancer, by changing the target protein it uses to cling to cancer cells, researchers said. "We are giving the surgeon a second pair of eyes to see where the cancer cells are and if they have spread. It is the first time we have managed to see such fine details of prostate cancer in real time during surgery," the lead researcher said.

CONTRIBUTOR: SHYLA JOVITHA ABRAHAM

# Impact of the double whammy of diabetes: salt and sugar

**S**alt and sugar are the twin whammies in our diets, which can have a significant impact on blood glucose levels as well as blood pressure. When it comes to salt, consuming too much can lead to insulin resistance, making it harder for cells to absorb glucose effectively. This can result in elevated blood sugar levels over time in addition to increasing the blood pressure.

On the other hand, excess sugar intake can cause rapid spikes in blood glucose levels as the body struggles to process and regulate the influx of sugars from our diet. This constant fluctuation can put stress on the pancreas and contribute to insulin resistance.

By understanding how salt and sugar affect our blood glucose levels, we can make more informed choices about what we eat. Opting for whole foods that are low in added sugars and sodium is key to maintaining stable blood sugar levels and supporting overall health.

## The Link Between High Salt Intake and Type 2 Diabetes

High salt intake has been linked to an increased risk of developing type 2 diabetes. When we consume too much salt, our bodies retain water to dilute the excess sodium in our bloodstream. This can lead to higher blood pressure and insulin resistance, a precursor to type 2 diabetes.

Moreover, excessive salt consumption can also contribute to inflammation in the body, which is known to play a role in the development of various chronic diseases, including diabetes. Studies have shown that reducing salt intake not only benefits blood pressure but also helps improve insulin sensitivity and glucose tolerance.

By being mindful of our salt intake and opting for fresh ingredients over processed food high in sodium, we can take proactive steps towards reducing our risk of developing type 2 diabetes. It's essential to read labels carefully and choose low-sodium options whenever possible for better long-term health outcomes.

## The Effects of Added Sugars on Insulin Resistance and Type 2 Diabetes

Insulin is like a key that unlocks your cells to let glucose in for energy. However, when there's an excess of sugar in your diet, this process gets altered. Your cells become resistant to insulin's effects, leading to elevated blood sugar levels.

Over time, this constant spike in blood sugar can put immense strain on your pancreas as it tries to produce more insulin. Eventually, this continuous



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demand may exhaust the pancreas, resulting in decreased insulin production and ultimately leading to type 2 diabetes.

To combat the negative effects of added sugars on insulin resistance and diabetes risk, it's essential to be mindful of your sugar intake. Opt for whole food over processed ones and limit sugary beverages and snacks for better blood sugar control.

## Strategies for Reducing Salt and Sugar Intake in Your Diet

Reducing salt and sugar intake in your diet can significantly impact your overall health. Start by reading food labels carefully to identify hidden sources of salt and sugar in packaged food. Opt for fresh fruits and vegetables instead of processed snacks high in added sugars.

Cooking at home allows you to control the amount of salt and sugar you add to your meals. Experiment with herbs, spices and citrus flavours to enhance taste without relying on excessive salt or sugary sauces. Stay hydrated with water instead of sugary beverages like soda or energy drinks. Limiting these liquid sources of hidden sugars can make a big difference over time. Snack smart by choosing nuts, seeds or plain yogurt over sugary treats when cravings strike.

By making small but consistent changes to reduce salt and sugar in your diet, you can take proactive steps towards managing diabetes effectively.

In managing diabetes, moderation is key when it comes to consuming salt and sugar. By being mindful of your intake and making conscious choices to reduce the amount of these two in your diet, you can positively impact your blood glucose levels and overall health.

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Puja Awasthi

# NOT JUST SKIN DEEP

The skin is the largest organ in the body and how to take care of it is best explained by an expert

**D**r Sunil Sanghi, 57, senior consultant, dermatology, studied medicine at the Armed Forces Medical College in Pune. A fellow of the American Association of Dermatology, he enjoys playing lawn tennis and table tennis.

## BEYOND 'JUST' SKIN:

The condition of our skin is indicative of overall health. Thus skin which is yellow, blotchy or sallow is indicative of trouble elsewhere. Many diseases like hepatitis first manifest as itching or rashes on the skin. The quest for beauty has shone an even more intense spotlight on it.

**THE LOOK OF HEALTH:** A healthy skin reflects a healthy body. Such skin is smooth, warm, hydrated and has an even tone. There are five primary skin types: oily, dry, normal, combination and sensitive. Each skin type has its own sets of unique characteristics and needs that can affect the look and feel of

your complexion. A balance of oil and moisture leads to blemish-free and smooth skin with fine pores. While genes play a major role in skin type, care routine, sunlight, temperature, stress, hormones, smoking, alcohol and exercise also affect it.

**SIGNS THAT ALL IS NOT WELL:** Flakes, cracks, rashes or visible hair and nail changes.

**NORMAL CHANGE:** The skin becomes thinner over time. There is loss of volume, especially in the cheeks, and bags form under the eyes. The effects of aging on the face are inevitable. These changes are normal with time. A newborn has delicate skin, teenagers have acne and the elderly have wrinkles. During pregnancy or rapid weight gain or loss, stretch marks can appear, which, despite the marketing hype, will not go. The marks result from the dermis—the middle layer of the skin—being stretched beyond its capacity and a resultant tear in its fibres.

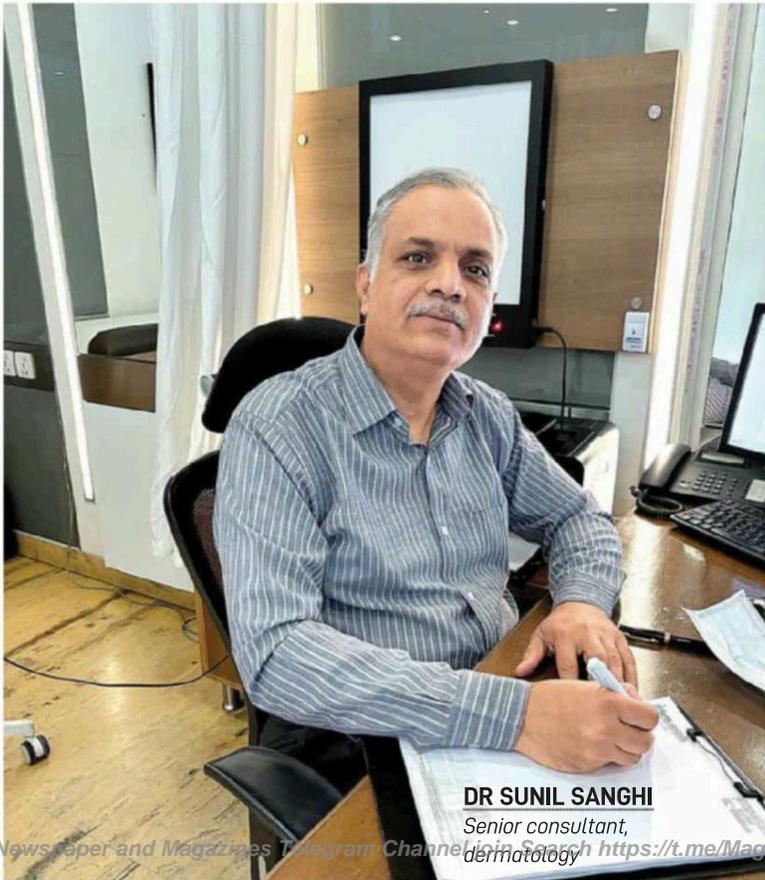
## WHAT IS UNACCEPTABLE:

Severe acne leading to scars, rapid wrinkling and loss of volume or early progression of baldness.

**INDIAN SKIN:** Is much thicker than Caucasian skin, more prone to pigmentation and less prone to melanoma, the most dangerous type of skin cancer. The pigment in the skin is a boon.

**MALE SKIN:** Is approximately 20 per cent thicker than female skin, with more collagen (protein) and tightness. Men get more infections, but women have more pigmentary disorders, allergic diseases and hair problems. (The scalp is also skin.)

**WHERE WE LIVE:** Has little impact on our skin, though external factors like low temperature and high altitude cause changes. Low temperature, for instance, makes it harder for the skin to retain moisture, and makes it dry or itchy.



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**DIET:** Which supports overall health also promotes good skin health. Nutritious food like fruits and vegetables, whole grain and healthy fats are good for the skin. Among the biggest misconceptions about diet is the role of food allergens in skin conditions and certain food practices associated with acne (eating sour foods, for example, does not enhance acne).

**COMMON INDIAN SKIN PROBLEMS:** Acne (clogging of hair follicles under the skin), eczema (inflammation of skin), psoriasis (build-up of cells causing scaly, itchy skin), fungal infections and hair disorders. Increasing pollution and temperature can trigger or worsen skin problems like rashes.

**NO CURE FOR SKIN PROBLEMS?** This is a misconception. With rapid advances in available therapies, most chronic skin conditions like psoriasis can be treated, ensuring a good quality of life. Both cure and continuous management work in various skin diseases just like in other chronic conditions like diabetes and hypertension.

**WHY SO MANY STEROIDS?** Dermatologists use steroids when needed. In such cases, benefits outweigh risks. The problem is self-medication, with over-the-counter prescriptions, especially topical steroids, being misused. The current epidemic of fungal infections is caused by the use of OTC medication, which addresses some obvious problem, but aggravates the real

cause. For some conditions like anaphylaxis—a life threatening inflammation—steroids can be life-saving. The only skin regime you need: Good cleaning in the morning, followed by a toner (for removal of left-over dirt), moisturiser and sunscreen. In the night, use a cleanser, toner, retinoids and a moisturiser.

**UNFAIR FAIRNESS:** Allergic reactions are very common with the long-term use of pigmentation creams available over the counter. These lead to untreatable pigmentation and red, sensitive skin which persists lifelong.

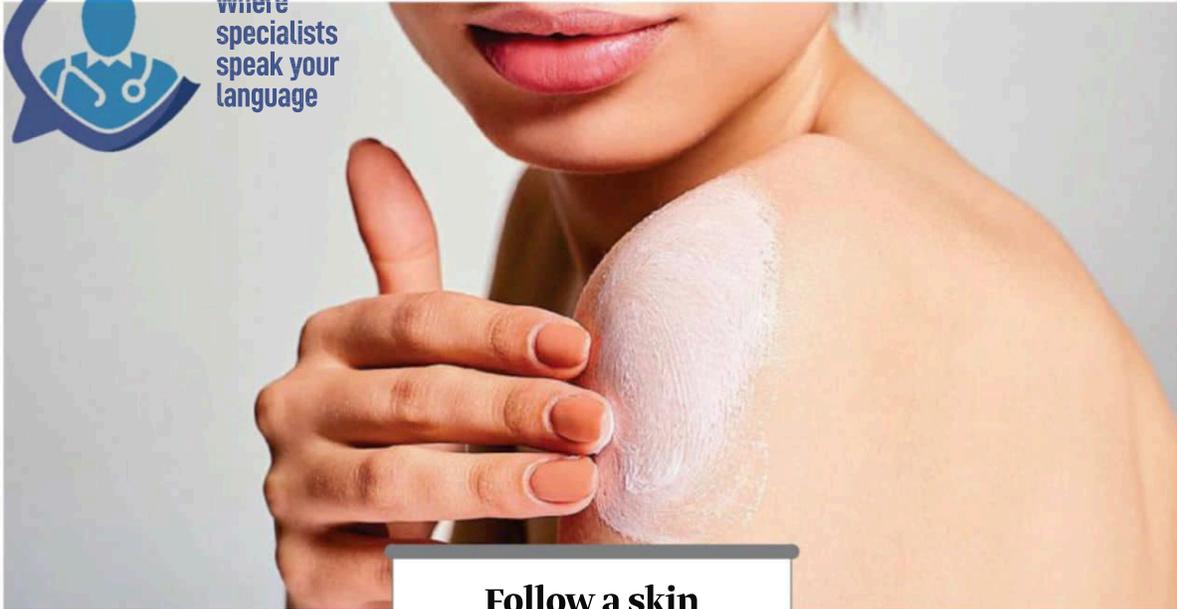
**EXPENSIVE IS NOT BEST:** It is a myth that expensive creams can keep your skin young forever. The skin cream industry is huge, with significant reach on social media. But no skin cream can protect indefinitely against aging. It is better to visit a dermatologist once to understand the correct regimen for your skin, rather than spending money on products which are industry-driven.

**SKIN FADS:** Such as the recent Korean glass skin trend only promote misinformation for a ‘perceived’ perfect skin. No one should cultivate false hopes as there has been no scientific analysis of ingredients in products which promise the unbelievable.

**NATURAL IS NOT ALWAYS SO:** Products marketed as ‘natural’ are popular among consumers, but being natural does not mean they are effective or safe. Though comparatively expensive, they offer no additional benefit over cheaper



Where specialists speak your language



SHUTTERSTOCK

**Follow a skin care regimen with cleanser, moisturiser and sunscreen. Read what ingredients go into these products and use as per skin type, weather and external environment.**

medicated products. Aloe vera, for example, has been used for centuries for its health, beauty and medicinal properties. Though usually safe, it may cause allergic reactions in some people. This is true of all products.

**LOOK OUT:** For skin products that are healthy and good for the environment. Read and understand labels. Avoid parabens, for instance, which upset the skin's environment. Look for detailed information on the ingredients used. Organic products might not have lab-made substances, but colours and fragrances can also cause allergies. A sunscreen, for instance, is useless if it does not have zinc oxide, and can in fact have harmful ingredients, such as salicylate.

**GOING TOO FAR:** The influence of social media in promoting the use of expensive, anti-aging products at a young age.

**MYTHS:** Chocolate and oily food cause acne. Anti-bacterial

soaps are good for skin. Natural and organic products are a better choice. All sun exposure is bad for skin. The higher the SPF the better the sunscreen.

**SOME RED FLAGS:** Fever with rash, painful swelling of skin, change in existing moles, loss of sensation or fluid-filled eruptions.

**DO NOT SELF-MEDICATE:** Any self-medication should be stopped immediately. Let me give two examples: We are currently going through an epidemic of fungal infections caused by OTC steroids. And self-medication with antibiotics

is leading to significant antibiotic resistance.

**TRAPS:** The quest for ever-youthful skin leading to misuse of anti-aging creams. Hair oils that cure balding. Complete cure of psoriasis, vitiligo and eczema with alternative medicine. Quick-fix botox/bleach/skin peels.

**TIPS:** Have a balanced diet of adequate fruits, green leafy vegetables and healthy fat in the form of nuts and flax seeds. Follow a skin care regimen with cleanser, moisturiser and sunscreen. Carefully read what ingredients go into these products and use as per skin type, weather and external environment. Avoid stress and smoking, and exercise adequately. Essential oils can have some benefits, but which ones to be used should be individually determined. Such oils in heavy concentration can lead to skin irritation and worse.



# SILENT DEHYDRATION

Swati Amar

Dehydration often goes unrecognised as most are not aware of the symptoms that silently affect our body. Dr Suranjit Chatterjee, senior consultant, Internal Medicine, Indraprastha Apollo Hospital, New Delhi, talks at length about how the silent symptoms of dehydration can overtake us if we are not careful about maintaining the fluid balance in our body during hot summers.

### Why does dehydration happen?

According to Dr Chatterjee, when we are not able to assess the amount of intake of fluids in relation to underlying health or environmental conditions, dehydration can happen. One of the most common reasons for our body to go silently into a stage of dehydration is simply because people are so engrossed in work that even in air-conditioned workplaces, they tend to get dehydrated as they do not drink enough water. People who work or commute long hours in the sun lose a lot of water. High-grade fevers and certain illnesses can also cause dehydration. Cardiac, kidney and liver patients on diuretics and restricted fluids can get dehydrated if they do not maintain the right fluid balance.

Most of the fluid loss in the body occurs through urine, motion and sweat. But there is also fluid loss everyday due to what is known as 'insensible fluid loss', which cannot be measured and this happens through the respiratory system, skin and water excreted in the motion and this, too, needs to be replaced.

Strenuous exercise or sports during hot weather, gastroenteritis and other conditions with vomiting or diarrhoea, excessive alcohol consumption, complication of diabetes and hormonal imbalances can also cause dehydration. Not only is there a fluid imbalance in the body, but there is electrolyte imbalance, too, which can lead to serious conditions.

### Symptoms of silent dehydration

- Thirst
- Dryness of mouth
- Lethargy
- Feeling dizzy or light-headed while standing



When the body is getting dehydrated, it sends us signals. We must answer the body's demands to prevent complications of dehydration.

**DR SURANJIT CHATTERJEE,**  
Senior consultant, Internal Medicine, Indraprastha Apollo Hospital, New Delhi

This public awareness initiative is supported by  
**apex laboratories private limited**  
Chennai



- Headache
  - Dark-coloured urine
- Symptoms of severe dehydration**
- Excessive thirst and dryness of mouth
  - Fast breathing
  - Fast heart rate
  - Low blood pressure
  - Fever
  - Little or no urine output
  - Irritability, confusion and drowsiness

### Protecting senior citizens and children

Dr Chatterjee cautions about

extremes of age as senior citizens and children are vulnerable to dehydration. Many senior citizens cannot sense their fluid requirements or may have medical conditions that may need monitoring of fluid intake by their doctors. Senior citizens with cardiac, kidney or liver problems may be on diuretics and under advice by their doctors to restrict their fluid intake. They need to be guided by their GPs or doctors on adequate amounts of fluid intakes.

### Rehydration

When a person has symptoms of dehydration, the first line of treatment is to drink a lot of water. Oral rehydration solutions or homemade drinks like *shikanji* or homemade lemonade can replenish fluids and electrolytes immediately. If there is vomiting and the person cannot retain fluids, they must be given intravenous fluids in a hospital. After initial administration of fluids at home, if dehydration symptoms continue, medical attention is required.

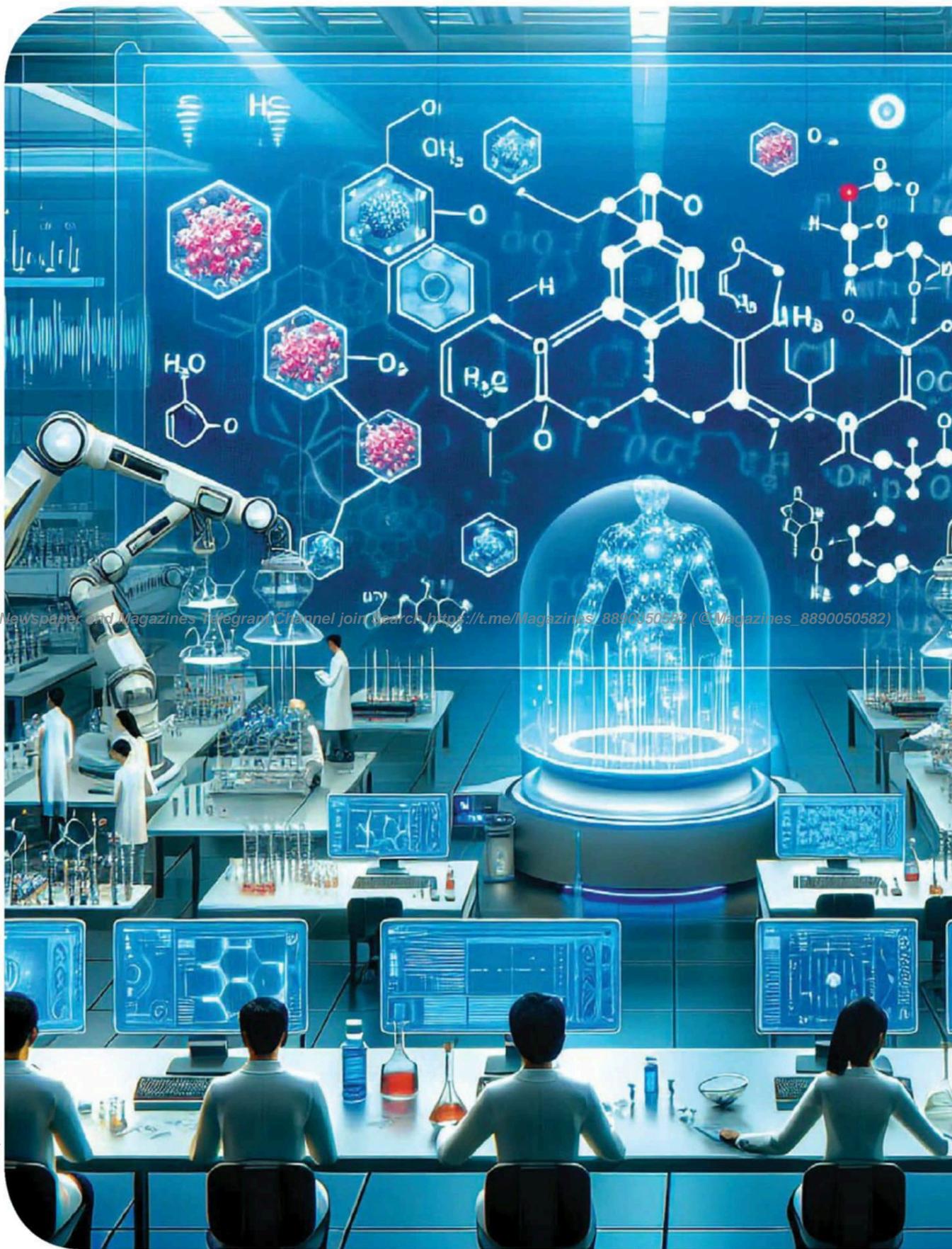
### How much water is good enough?

Daily water consumption depends on environmental factors, age, activity level and medical conditions. During summer months, for a normal, average adult in India for women, about 2.5 to 3 litres and for men 3.5 to 4 litres of water can be had in a day. Children from 4-8 years can drink about 5 to 6 glasses of water a day while children from 9-13 can drink 7 to 8 glasses. Breastfeeding women and people engaged in sports and physical activities must drink more water. People with pre-existing kidney/liver/cardiac diseases, urinary tract disorders or other medical conditions must follow their doctor's advice.

### Tips to prevent dehydration

- Drink water before going out, especially if for a sport or exercise
- Don't exercise or do a sport during the peak of heat or humidity
- Wear light-coloured, loose-fitting cotton clothes
- Avoid fried, spicy and hot food
- Include fruits, juices and lightly cooked food
- Fizzy drinks like coke, artificial juices and alcohol can cause more dehydration

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SHUTTERSTOCK/AI



# AI-PILL

**DRUG DISCOVERY IN INDIA IS NOW BEING AIDED BY ARTIFICIAL INTELLIGENCE. COMPANIES ARE USING AI TO DEVELOP FASTER AND CHEAPER MEDICINES TO TREAT RARE DISEASES, CANCER, DIABETES AND MORE**

By Nirmal Jovial

**J**ins Antony and Grace Janilet from Ayur in Kerala are in a race against time, seeking a cure for their firstborn, Jion. They are acutely aware that unless medical science expedites its efforts to find a miracle drug for their child's worsening condition, he will die soon. Jion, 10, suffers from Duchenne muscular dystrophy (DMD), a genetic disorder characterised by progressive muscle degeneration and weakness. "This condition arises due to alterations in a protein called dystrophin, which helps maintain muscle cell integrity," says Antony, 42, who runs a paint shop. DMD can affect all kinds of muscles, including the diaphragm—the muscular partition separating the thorax from the abdomen, and which aids breathing. And, that makes it fatal. "Currently, there is no definitive cure for this rare disease," says Antony, adding that time is running out for Jion, "as Indian DMD patients rarely survive beyond 20 years".

In the past, Jion, like any other kid his age, would run and play

around. But these days, he struggles to walk without support. His eyesight, too, has diminished in recent years. At school, while other children play, he sits and watches them. He does not join them for fear of falling and breaking his bones. He still rides his bicycle, but is unsure if he can continue his favourite activity for long.

DMD is caused by a mutation in a gene that encodes the dystrophin protein, and is located in the X chromosome. Since the gene is tied to the X chromosome, DMD usually affects individuals assigned male at birth—since they have XY chromosomes, they receive only one X chromosome from their mothers and therefore have no other functioning gene to compensate.

DMD symptoms usually show up by the age of three, but children are usually diagnosed at the age of six. Jion was diagnosed with DMD only when he was seven. “We were unaware of this disease until then,” said Antony. “My wife and I did not sleep the first two months after we learned about the test results.”

Steroids are the mainstay of DMD treatment today. Gene-based therapies like exon-skipping to produce usable dystrophin protein are available, but are too expensive. For instance, exon-skipping therapies, such as deflazacort, at its approved dose, can cost approximately ₹7.5 crore per year. Antony has already shelled out a fortune for Jion’s treatment in the last three years. With no cure and the long-term expense and effort involved, caring for a loved one with DMD can take a toll on any family with limited means. The thought in itself can be daunting and depressing. In July 2023, a family of four, including two children, died by suicide in Kerala’s Malappuram after the children were diagnosed with DMD.



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NIRMAL JOVIAL

**RIDING ON HOPE**

*Jion Antony with son Jion, who suffers from Duchenne muscular dystrophy*

“  
**Instead of conducting numerous experiments, AI can predict which experiments are most likely to succeed in the laboratory, thereby accelerating drug development.**

*Riyaz Syed  
founder, Centella AI Therapeutics*

Antony and Grace, too, were depressed in the initial months of Jion’s diagnosis. “However, after a phase of depression and lamentation, my wife and I decided not to give up,” said Antony. “We face every day with the hope that the medical community will soon come up with an affordable drug for my son’s condition, before it is too late.”

The good news for many families like Jion’s is that there are several Indian companies working for accelerated and cheaper drug discovery with the help of artificial intelligence. One such company is Peptiris—an eight-member virtual preclinical research firm that focuses on helping develop drugs for muscle-

related rare diseases like DMD.

Drug discovery is a slow process, taking 10 to 15 years. It involves research, development and production of molecules, which are like keys that open a disease’s lock. So, labs are finding the right key among many for a specific disease or modifying an old key to fit a new lock. And, chemistry plays a vital role here because of its ability to decode molecular interactions. Many of the drugs developed in the last century come from molecules derived from natural sources like plants, bacteria and fungi. As the discovery and development of these molecules slowed, manmade molecules were brought in. But they are not enough.

In drug discovery, various strategies are employed to identify potential drug candidates. These may be broadly classified into three types: target-based drug discovery, phenotypic drug discovery and repurposing existing drugs. Target-based drug discovery involves understanding the pathophysiological (abnormal changes in body functions) basis of disease and identifying specific protein targets that play a role in the disease phenotype. Phenotypic drug discovery focuses on observing the effects of potential drugs on whole cells or organisms without prior knowledge of the target. The repurposing existing drugs strategy, the cheapest among the whole, involves evaluating drugs developed for specific therapeutic purposes for potential use in new disease areas.

Shridhar Narayanan, cofounder and scientific adviser of Peptiris, told THE WEEK that in diseases like DMD, the startup



## Our AI algorithms can precisely identify indications of heart disease

By Nirmal Jovial

The Internet of Things has seamlessly integrated into our lives, extending from our kitchens to our very bodies. One of IoT's most significant impacts is its role in the early detection of diseases. Indian innovators have developed significant solutions tailored for India, considering the country's size and diversity. In an exclusive interview with THE WEEK, Arindam Sen, director of Heartnet India Pvt Ltd, discusses one such solution by his firm for early heart disease

detection. Excerpts:

**Could you explain how IoT-driven solutions enhanced by AI facilitate early heart disease detection?**

In recent years, heart disease has become a significant issue in India, leading to a high number of deaths. According to the World Health Organization, cardiovascular diseases are responsible for almost 25 per cent of all deaths in the country. A key obstacle is identifying

heart problems at an early stage, particularly in remote areas with limited health care access. This is where IoT technologies like Heartnet step in. Heartnet collects crucial information such as heart rate and blood pressure, and transmits it to a monitoring platform via the internet. AI subsequently examines the data for any discrepancies and alerts health care professionals. This technology has the potential to improve health care access in remote areas, enabling patients

is employing two of the above-mentioned strategies with the help of AI to create a potential drug. "One is to use artificial intelligence to find novel chemical molecules for particular targets, and second is repurposing, in which we examine already existing drugs for some of these disorders," he said. "We have put a priority on finding some drugs that can be repurposed and be given to DMD-affected kids at the earliest."

Riyaz Syed, founder of Hyderabad-based AI-first drug

discovery company, Centella AI Therapeutics, said that other than muscular dystrophy, idiopathic pulmonary fibrosis and amyotrophic lateral sclerosis are other rare diseases for which research powered by AI is being used in target identification and target validation.

### Time travellers

The drug discovery value chain is extensive, beginning with the phase of identifying and validating disease targets. These targets

refer to proteins responsible for the disease. Once a target is identified and validated, the focus shifts to designing new drugs tailored to that target. "This involves starting with molecules and progressing to lead optimisation and the selection of preclinical candidates," said Syed. "However, the initial design may not yield a viable drug, requiring multiple iterations and optimisation of various parameters, such as absorption, distribution, metabolism and excretion. This iterative process, known as the DMTA

to track their cardiac health and avoid severe complications in the future.

#### What prompted the development of this innovation?

The abrupt increase in the incidence of cardiovascular disease among close friends and family members, particularly among those in younger age groups, prompted a serious consideration of strategies for prevention. Subsequent research into lifestyle factors, the impact of diabetes and familial predisposition to cardiovascular issues culminated in the development of the Heartnet.

#### Could you elaborate on the role AI plays in this mechanism?

Heartnet's AI algorithms can precisely identify indications of heart disease, such as coronary artery disease, atrial fibrillation or any abnormalities in the heart. This allows for early treatment, minimising the chances of life-threatening complications and enhancing patient results.

Using AI technology assists in predicting the chances of developing heart conditions by examining a person's information such as medical background, way of living and genetic elements. This enables doctors associated with Heartnet to customise treatment plans and advise patients according to their specific risk factors, consequently decreasing the chances of developing future heart diseases.

AI is not only utilised for early detection and prediction but also for remote monitoring and management of heart conditions. Remote monitoring of cardiac complications can greatly enhance the treatment of chronic conditions. Through regular screening of a patient's health records, these algorithms identify trends that could indicate a high risk of developing heart diseases, enabling health care professionals to intervene early and avoid potential heart problems.

compound libraries (collection of stored chemicals) synthesised for various purposes for each new target they identified. Now, with AI, things are different," he said. "While you may focus on a specific protein, the number of chemical molecules you can explore is vast, running into billions. This increased chemical diversity, facilitated by AI, significantly boosts the chances of finding successful compounds. When it comes to biological assays, setting them up, validating them and screening millions of compounds is no small feat, both in terms of time and money. However, AI now allows for this to be done with larger compound libraries at a fraction of the cost and time."

Shridhar has been part of teams that have created 18 clinical candidates for infections, diabetes, oncology, inflammation, pain and cardiovascular diseases. Interestingly, Peptris, which raised \$1 million in a funding round in December, was formed as a result of a 'dad talk' Shridhar had with his cofounder Narayanan Venkatasubramanian, an IIT Delhi alumnus with more than two decades experience in system architecture and software development. "Our children attend the same school, which led to us to becoming family friends," he said. "This connection gradually evolved, leading us to engage in discussions beyond school-related events. We began inquiring about each other's professions, interests and the latest developments in our respective fields, fostering a deeper understanding of each other's domains. So, it was our children who initially brought us together, and from there, the

cycle (design, make, test, analyse), involves designing molecules for disease proteins, testing them in laboratory settings and analysing the results. Typically, this process involves seven to 10 iterations, depending on the complexity of the disease." What AI does is to streamline this process by reducing the number of iterations and minimising human intervention, added Syed. "Instead of conducting numerous experiments, AI can predict which experiments are most likely to succeed in the laboratory, thereby accelerating

drug development and reducing delays in delivering therapies to patients," he said.

Shridhar, who has a postdoctoral degree in neuro-pharmacology and heads a not-for-profit organisation—Foundation for Neglected Disease Research—said that in the past, researchers would perform limited chemistry experiments and conduct high-throughput biology tests, which is essentially testing thousands of molecules at once for their efficacy against a specific drug target. "They would test

foundation for a novel idea was laid.”

Along with Shridhar and Venkatasubramanian, data science expert Anand Budni and algorithm expert Amit Mahajan form the core team of Peptris. Together they developed an AI and machine learning-based

computational platform to rationalise and provide insights into experimental data in molecular biology and further make predictions to generate hypotheses for newer experiments to be done.

“We are now able to screen over a billion molecules essen-

tially employing AI,” said Venkatasubramanian. “Instead of physically conducting tests, we can now perform these tests virtually. Over the last four or five years, the number of chemical entities, or novel chemical entities, has increased significantly. However, this abundance of information



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#### TEAM SPIRIT

Shridhar Narayanan  
(second from right)  
and Narayanan  
Venkatasubramanian  
(second from left;  
back row) with the  
Peptris team



isn't easily searchable. For instance, if you want to find out which molecule would work for a specific protein, you would need to sift through a vast amount of data to provide the best possible results. So, the challenge lies in developing algorithms that can conduct such searches effectively.”

The software expert added that there is a need to represent molecules in searchable formats to determine the best matches or approximate matches for a given protein. Then, further analysis and testing would be conducted to validate the findings. “Essentially, it is like conducting a mini search within the vast chemical space available,” said Venkatasubramanian. “You could think of it as organising a vast collection of books in a library and cataloguing them in a specific way to facilitate easy retrieval. In this context, AI is akin to creating a catalogue for these molecules, making unique representations for each of them.”

Peptris has meticulously gathered millions of data points, encompassing structural details, annotations and properties data related to proteins, molecules and their interactions sourced from public databases. It now has the capability to accurately predict binding affinities in both protein-small molecule and protein-protein interactions. This essential capability is what they use to expedite drug discovery in different domains.

Syed pointed out that the efficiency that AI brings to the drug discovery process is invaluable. “Our generative

**Peptris now has the capability to accurately predict binding affinities in both protein-small molecule and protein-protein interactions. This essential capability is what they use to expedite drug discovery in different domains.**

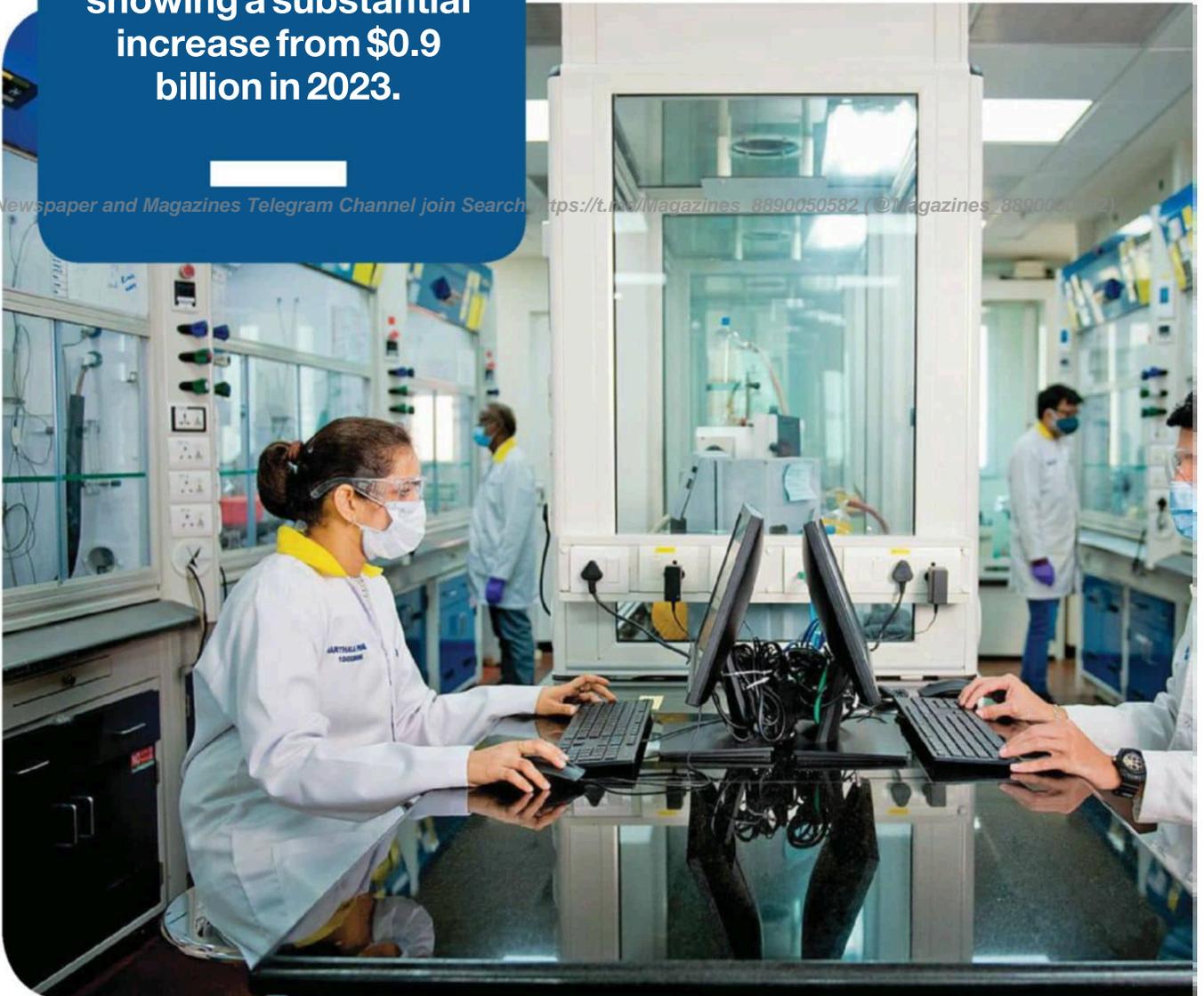
algorithm produced approximately 15 molecules targeting a specific cancer type, and we synthesised them accordingly,” he said. “The success rate from these synthesised molecules was approximately 80 per cent, which is notably high compared with the traditional success rate of 35 to 50 per cent. Our method consistently achieves success rates ranging from 75 per cent to 80 per cent, demonstrating its efficiency in generating novel and patentable molecules. Subsequently, we synthesised these molecules in the laboratory and conducted tests. Among them, approximately three molecules exhibited superior activity compared to the standard drug.” Centella has a special focus on diabetes, inflammation and gastrointestinal infections, too. “We are working

According to market research and consulting firm MarketsandMarkets.com, the global market for AI in drug discovery is estimated to reach \$4.9 billion by 2028, showing a substantial increase from \$0.9 billion in 2023.

on four targets based on these areas,” he added.

## Shining results

Syngene, founded in 1993 and headquartered in Bengaluru, is a leading provider of contract research services as well as integrated discovery, development and manufacturing solutions for various industries, including pharmaceuticals, biotechnology, animal health care, consumer goods and agrochemicals. Recently, Syngene made a significant breakthrough in combating pancreatic cancer by collaborating with Panbela, a US-based clinical-stage biopharmaceutical company, to streamline the production process for its pancreatic cancer drugs using AI technology.



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Before partnering with Syngene, Panbela was manufacturing its small molecule candidate SBP-101 for pancreatic cancer using a complex 15-step synthesis process. On engaging Syngene for chemical development, chiral purity checks (essential for quality control of drugs) of early batches revealed a chiral purity of only 85 per cent, falling below regulatory standards.

Syngene revamped the synthesis approach with the help of Syn.AI, the Bengaluru-based firm's exclusive platform tailor-made to streamline data-centric drug discovery. This helped in preventing the formation of undesirable intermediates, and led to the production of SBP-101 with a chiral purity of 98 per cent, albeit with 17 synthetic steps. Subsequently, Panbela tasked Syngene with reducing the number of reaction steps to expedite the drug's time-to-market while maintaining chiral purity. Syngene's chemists initiated the optimisation process, and eventually enabled the synthesis of SBP-101 in just six steps.

"This patent, which outlines a more concise synthesis method for SBP-101, offered numerous advantages, including faster manufacturing, expedited access to drug supply, expansion into new indications and the establishment of a scalable, efficient, and cost-effective manufacturing process to support future commercialisation efforts," said Jennifer K. Simpson, president and CEO of Panbela.

## Future is now

According to market research and consulting firm MarketsandMarkets.com, the global market for AI in drug discovery is estimated to reach \$4.9 billion by 2028, showing a substantial increase from \$0.9 billion in 2023.

Meanwhile, researchers like Shridhar attest that significant transformations have occurred in the drug discovery domain in recent years. Specifically, he highlights the disruptive impact of newer and advanced technologies like 'click chemistry', which offer a rapid, straightforward and adaptable approach to synthesising new molecules, thereby expediting the drug discovery process.

"What click chemistry has achieved is remarkable," he said. "Over the past five to 10 years, there has been an exponential increase in the number of synthesisable molecules that can be produced with just two or three steps and lower energy requirements in a standard laboratory—all thanks to click chemistry. This advancement has resulted in a significant surge in the volume of data generated in the chemistry domain." For example, in 2017, the largest available libraries contained fewer than a billion compounds, whereas now they contain approximately 43 billion to 44 billion compounds, he said. "This number continues to escalate rapidly, demonstrating the accelerated evolution of synthesisable and purchasable compounds, which in turn creates a superhighway for discovery processes," said Shridhar.

Furthermore, researchers emphasise that the abundance of data leads to the emergence of more solutions in drug discovery. They also assert that they do not foresee AI replacing humans in fields such as drug discovery.

"The drug discovery process carries profound implications for life and death. We cannot entrust artificial intelligence with making decisions on our behalf," said Syed. "At each stage, every action taken by artificial intelligence undergoes thorough scrutiny, meticulous analysis, and only advances to the next level with human intervention." 🌟🌟🌟

### SCREENING TIME

Syngene employees at work



## INTERVIEW

MORTEN MELDAL,  
Danish scientist and Nobel laureate

# Click chemistry is like making small molecular robots out of building blocks

By Nirmal Jovial

Chemistry is everything, including when you fall in love.

That is Danish scientist Morten Meldal's oft-repeated statement. His wife, Phaedria Marie St Hilaire, also a distinguished scientist, agrees. Dominican-born Hilaire, founder of the nonprofit The Professional Women of Colour (ProWoc) network, says that "the chemistry of love" between them 'clicked' during their shared lab endeavours.

Meldal, along with American chemists K. Barry Sharpless and Carolyn R. Bertozzi, won the Nobel Prize in 2022 for their groundbreaking discovery of 'click chemistry,' a revolutionary method for constructing complex molecules. This innovation holds immense potential to shape our future. But in an exclusive chat with THE WEEK, Meldal, 70, remains humble, characterising it as something simple. Excerpts:

**You often mention that your curiosity and early interest in science was instilled by nature, on your grandfather's farm.**

Yes, I have a lot of wonderful memories from my childhood. That's why I love nature so much, in particular in connection with being in nature. I have very clear images of sitting on a cherry tree, eating the wild cherries and then going to the

beach and swimming. I think that childhood should be a happy time where you learn all of these things and get a feeling for what the world is all about.

**Your Nobel Prize was for click chemistry. Building complicated molecules is something very important in different domains. Your discovery introduced an efficient and time-saving method to create these complex molecules. What is click chemistry and how has it revolutionised the field?**

I always use the comparison with Lego, the building blocks that originated in Denmark. You can put Lego blocks together and construct new architectures from them. In the same way, we can take a block, say a functional protein or carbohydrate, which is like a signalling molecule, and put that on the protein with a click reaction. So, we click them together, like snap, snap, snap, and we don't need to use any of the normal chemistry to do that. We just use click reaction again and again in this process, and we get very complex architectures with multiple functions. So, we make small molecular robots out of building blocks. The thing is that it could not be done before. So, it is an entirely new field that you open up with this click reaction. It is a new type of chemistry, which is completely perpendicular to all other





NIRMAL JOVIAL

**CHEMIST  
COUPLE**

*Morten Meldal  
with wife  
Phaedria Marie  
St Hilaire*

chemistries. So, it doesn't influence the other chemistries, and the other chemistries don't influence this chemistry. So, we can do these normal chemistries first and then we can click things together to make very complicated architectures without any kind of conventional chemistry around it.

In 2002, Sharpless and you independently came up with the 'copper catalysed azide-alkyne cycloaddition', which is now regarded as the crown jewel of click chemistry, and won the Nobel in 2022. Did you expect it?

No. We did not have any idea. In 2006, we could see that the number of citations was increasing exponentially. So, something happened. Of course, biologists got hold of it, material scientists got hold of it and so on. And in 2013, Chemistry and Engineering News was talking about click chemistry as Nobel Prize-worthy. But then nothing happened.

This is the first time the Nobel Prize is given for making something simple. Normally, it is the opposite; [you are awarded when] you make something complicated.

Could you please share how some of the most significant applications of click chemistry emerged over the last two decades?

In Halle, there is work going on to develop aeroplane paints, which are self-healing. So, if you get a crack in the paint, instead of getting corrosion in the wing, it should glue together again and click. So, you get a new polymer instead of corrosion. The other thing is in materials—a lot of coatings are clicked today. You also have [newer] strong materials [created using click reactions]. You have drugs, which are now today synthesised almost exclusively in water, instead of all these organic solvents that you have to recycle and distil. You can now do these kinds of complicated reactions in water due to the selectivity of the click reaction. So, you don't

need a lot of extra things around your molecule to make the reaction work. Well, it is already in use in the development of two compounds [to treat] liver fibrosis and lung fibrosis. We have two compounds that are in the clinical trial stage, and these are made exclusively in water by clicking together relatively complex carbohydrates and aromatic compounds.

How is this being used in cancer treatment?

Two groups are working on cancer treatments at the moment. One is using the click reaction to attach a radioactive atom to a ligand (an ion or molecule attached to another) that searches out the cancer cell and kills it. So, by searching out the cancer cell, and then sitting on the cancer cell, it can deliver the radioactivity where it wants it and kill the cell. The other one is not our click chemistry, but the TCO chemistry, where you can first attach one component on a cell, and then you have the component sticking out. Then you come with the other component and that component will react. And, in the process, it releases a cytotoxic compound that kills the cell. So, when it clicks, it kills and it can only click on the cells that are sick.

What are the applications of click chemistry in Alzheimer's treatment?

In the development of Alzheimer's treatment methods, we are using click chemistry to hold on to molecules, to maintain the structure of molecules that shall recognise the Alzheimer's plaque and dissolve them.

A lot of DNA research areas are also being explored by employing click chemistry.

Yes, DNA can be conjugated, so we can click together two molecules—a protein and a DNA or two pieces of DNA, or RNA and DNA—you can mix any way you like. ☺☺☺



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# TWIST *of* FAT

## Secret to weight loss? Make changes to your neurological passages

By Jack Rear

**W**eight loss miracle cures are everywhere. Every day a new study, product or trend promises a magic bullet that will banish fat and give you a svelte figure with next to no effort.

Fad diets date back to the 19th century, but the advent of Instagram and TikTok has led to a mass proliferation of get-slim-quick techniques from detoxifying teas to volume-eating diets.

“Self-esteem is at an all-time low, and not trusting yourself is a key feature of people who pursue quick-fix solutions,” says Dr Jo Perkins, a chartered psychologist. “You’ve tried it on your own, haven’t succeeded, so you lean on a magic solution.”

This is human nature, says Dr Perkins. “We’re hard-wired to want to expend the least energy on the best result—a hungry monkey reaches for the nearest banana rather than the one at the top of the tree—it’s the same with weight loss,” she says.

The trouble is that “we live in an instant gratification culture where it’s easier to order a weight loss product online than it is to

stop and think about it and why we even want it,” adds Dr Perkins. “There’s a perceived credibility that comes with being the first to discover something. It’s a double-whammy inducing us towards fads.”

However, in the long term, these techniques are tricky to stick to. Here are a few popular ‘weight-loss miracles’ and, crucially, why they won’t work in the long term:

### DETOX TEAS

Promoted as ‘flat tummy teas’, these products are presented as a natural way to reduce water retention, cleanse the digestive system, and ultimately lose weight. A common denominator in these products is often senna, a natural laxative.

One can get a flatter stomach on a detox tea diet because the laxative effect causes them to excrete food before it is fully digested. They often also contain diuretics which cause drinkers to pass fluid more regularly, resulting in a temporarily flatter stomach. However, consuming laxatives and diuretics can

cause stomach cramps and diarrhoea. As soon as a person stops consuming them, any perceived weight loss will be reversed.

### BEVERLY HILLS DIET

Created by the author Judy Mazel in 1981, this is an extreme diet that claims to promote weight loss through specific food combinations. The Beverly Hills diet is based on the idea that the order and combinations in which foods are eaten causes weight gain. Mazel claimed that eating foods in the wrong order could stop some foods from being digested, causing fat build-up.

The diet divides foods into four groups: carbohydrates, proteins, fruits, and fats. Fruit, even different types of fruit, must always be eaten alone. If a different type of food is eaten, such as a protein, the dieter must wait until the next day to eat fruit again. Protein and carbohydrates cannot be eaten together.

You won’t be surprised to hear that experts are very sceptical about whether food combining actually works. You will probably lose weight initially because

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of the low calorie intake, but it's very complicated to follow and following such a restrictive diet for an extended period of time could result in nutritional deficiencies. Best to confine this one to the history books.

**VAGUS NERVE STIMULATION**

Currently being trialled by scientists at Moscow State University, this technique involves clipping electrodes to a part of the ear which contains a branch of the vagus nerve, which stimulates appetite. So the thinking is that an electrical current passed through it could tell the brain that the stomach is full, curbing a person's appetite.

Vagus nerve stimulation has already been heralded as a miracle cure for epilepsy and depression, and animal trials have suggested that it may work for weight loss. Users in the Russian trial will wear the clips on both ears, connected to a battery-powered generator which will provide 10

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**We live in an instant gratification culture where it's easier to order a weight loss product online than it is to stop and think about it and why we even want it.**

*Dr Jo Perkins,  
chartered psychologist*

minutes of stimulation per day.

However, it is not clear whether it will work, let alone its long-term efficacy. "Ultimately, the only way to make weight loss work is if you can shift your habits to move your weight anchor down," says Dr Andrew Jenkinson, a bariatric surgeon and author of *How To Eat (And Still Lose Weight)*.

**CARNIVORE DIET**

This involves eating only meat. The idea is that protein has a 'high thermic effect', meaning the body has to burn more calories to digest it. Additionally, since protein is used for building muscle, the body quickly increases in muscle size, raising its basal metabolic rate—the calories are burned simply by staying alive.

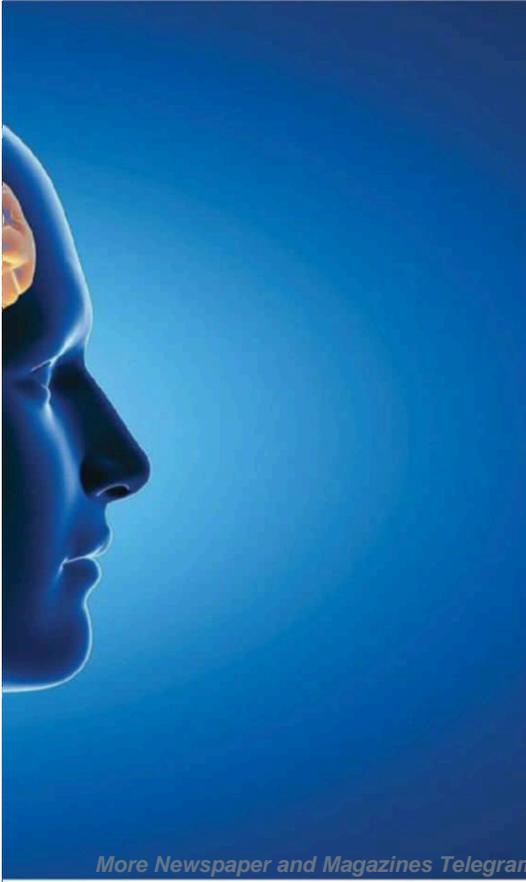
Weight-loss will happen on

this diet because of calorie restriction. The other supposed benefits are questionable, according to experts. "You can't magically take all of your protein in one meal and turn that excess into muscle," says the award-winning dietitian Priya Tew. "It will convert it into glucose and your body will either use it or store it."

**CABBAGE SOUP DIET**

A popular strategy which sees people eating nothing but cabbage soup for a week, stripping out any other aspect of their diet.

It will work temporarily, because of calorie restrictions. However, like all calorie-restricting diets, it's "prone to short-term success, long-term failure—as soon as you come off it, your brain will want to get back to its weight



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set point,” says Dr Jenkinson.

### VOLUME EATING

Based on the idea that food loses nutrients when cooked, this diet sees people eating only raw, plant-based foods that are high in water and fibre so you feel full. It is popular on TikTok as the rebranded concept of “volume eating” where dieters eat big helpings of low-calorie foods like spinach to stay full, avoiding carbohydrates.

The diet can help followers avoid the worst excesses of modern junk food. “The western diet is high in ultra-processed foods made with refined sugar and carbohydrates which causes our insulin to become high,” Dr Jenkinson explains. “This blocks your natural weight regulation hormone, leptin. Your brain then thinks you’re running on empty

and tells you to keep eating.” In short, by eating raw food and avoiding ultra-processed foods, you will stop overeating.

However, it pays to be careful. A 1999 study by German scientists looking into over 500 people on the diet over three years found that “since many raw food dieters were underweight and exhibited amenorrhea [loss of periods], a very strict raw food diet cannot be recommended on a long-term basis”.

### PERSONALISED DIETS

This involves getting analysis of blood or stool samples to create a hyper-personalised diet based on gut bacteria or DNA. The thinking goes that a person can optimise their intake to foods they are best able to digest.

“People love the idea that something is just for them, that you’re getting something no one else has understood,” says Dr Jenkinson. “But it’s based on pseudoscience. There’s no evidence that you can tailor a diet to your gut microbiome or that it will have any effect. Eventually all these diets end with advising you to eat normally, but avoid ultra-processed foods, which works but isn’t personal.”

### JUICE CLEANSE

Popularised by catwalk models and the Kardashians alike, juice diets were all the rage several years ago. The diet is essentially a simple calorie-restriction—by cutting out normal solid foods, you limit the amount you are eating, putting you into a calorie deficit.

Work has been put into making sure low-calorie meal replacement shakes have the

right nutrients and vitamins in them, so a reputable juice cleanse diet is usually nutritionally complete. However, according to Emer Delaney, a spokeswoman for the British Dietetic Association, juice cleanses are inherently unsustainable: “People might be able to follow them for a couple of weeks, but it’s not addressing your behaviour around food. They’re not sustainable. People can’t just go on drinking shakes for the rest of their lives.”

In short, once you come off the diet, the weight will go back on.

### THE REAL SECRET TO LASTING WEIGHT-LOSS

Lasting weight-loss happens by altering the brain’s weight anchor. “The brain is in control of your weight, not you,” Dr Jenkinson explains. “It is like saying you can control your breathing by holding your breath; the brain takes back over. It will drag you to the weight it wants you to be. The only way to lose weight sustainably is to understand why your weight anchor is set at such a level.”

Reducing the brain’s weight anchor is a gradual process, about adjusting habits and lifestyle in the long-term. “You can reduce it by changing not just the type of food you’re eating—cutting out those refined carbohydrates and sugars—but also by reducing your stress, and getting better sleep,” says Dr Jenkinson. “Forming healthy habits requires repetition. The more a habit is performed the more the neurological pathway will become ingrained into your brain. That’s when the weight anchor will move.”



# Branches of wisdom

**A symposium on traditional trees throws light on India's ancient knowledge**

By Pooja Biraia Jaiswal

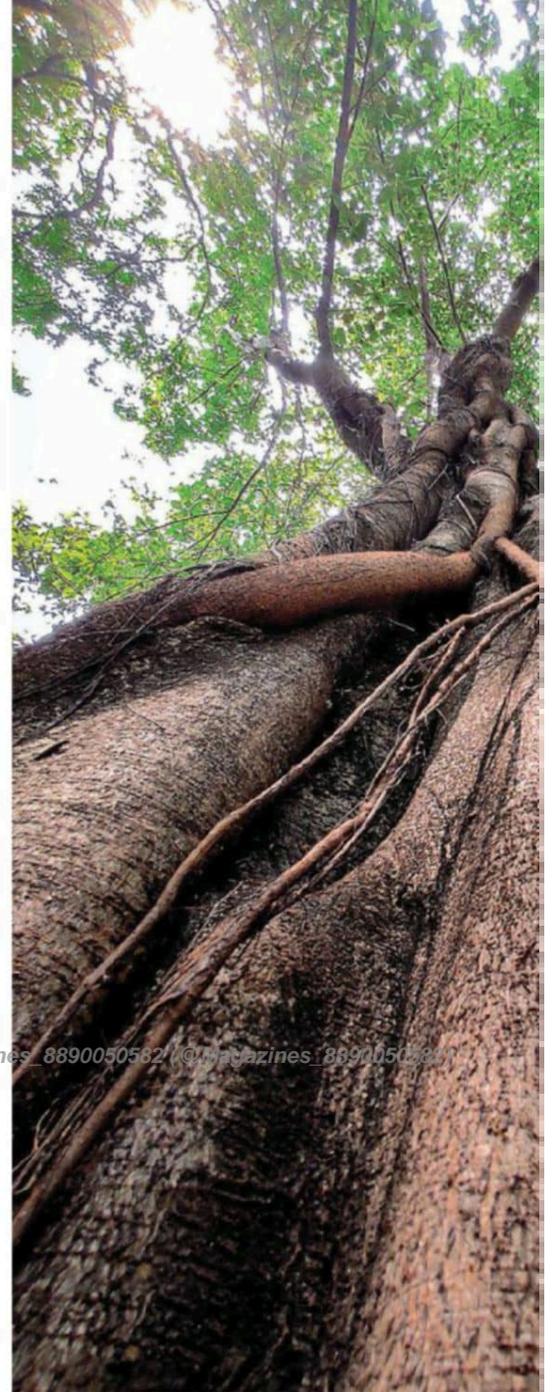
Goa Governor P. S. Sreedharan Pillai inaugurated a day-long symposium on the traditional trees of India, titled 'Vriksha Vygnanika Sadassu', at the Raj Bhavan on April 21. In attendance were experts from various fields who presented papers on traditional trees that have been worshipped over the years in India. "Trees shelter thousands of creatures of all kinds—algae, fungi, insects, squirrels, birds, snakes and other reptiles, animals and humans," Pillai told THE WEEK. "Every single part of a tree is useful, either as food, medicine, fuel, timber, or as source material for building various things. We must understand and appreciate their indispensable and invaluable existence on the planet."

In their research paper titled, 'Indian traditional trees and their scientific relevance', researchers Amit Kumar Tiwari, Indrajeet Chaudhary and Alok Kumar Pandey mentioned how *bel* (*Aegle marmelos*) and rudrak-

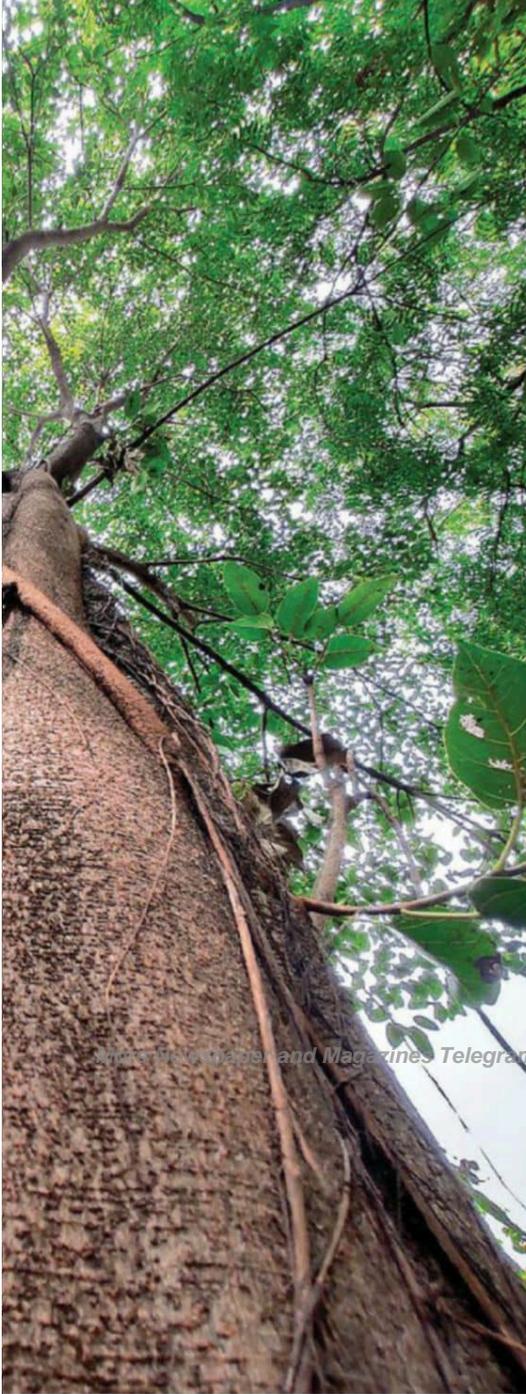
sha (seed of *Elaeocarpus*) were associated with Shiva, peepal tree with Vishnu, mango (*Mangifera indica*) with Hanuman and Ashoka tree with Kamadeva.

With the vedic civilisation and the knowledge of ayurveda, they added, society came to worship tulsi (*Ocimum tenuiflorum*), peepal (*Ficus religiosa*), banyan (*Ficus benghalensis*) and neem (*Azadirachta indica*) for their medical importance.

Dr Pradip Sarmokadam, member secretary, Goa State Biodiversity Board, spoke about the "traditional application of sacred flora of India in *yajnas* and associated rituals". The enormous research carried out by vedic scholars and subsequent experts, he said, should be further institutionalised as it has integrated a conservation ethos into lifestyles for the betterment of humanity. "If disregarded and neglected, we would be deprived of a huge knowledge repository that is well documented and has verification methods," he said.



The knowledge lies scattered and needs to be further strengthened by the integration of knowledge holders, he said. "I suggest we create conservatories of floral diversity of *samidha* (floral parts used as sacrificial offerings in *yagnas*) and make them available in its genuine form to establish ground-level successful models to depict floral diversity and its connect with Indian mythology," he added. "We should create facilities that would



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ration and should capture traditional wisdom-based knowledge systems such as vedic rituals and associated wisdom, along with such knowledge and practices in other religions as an important basis that will lead to conservation of biodiversity.”

N.K. Sundareswaran, professor of Sanskrit at Calicut University, elaborated on the topic of 'Trees in the vedas'. “Here, the metaphor of the nest implies a huge tree, which is seen as a support of the ecosystem,” he said. “One may recall the explicit description of a similar huge tree in the Mahabharat: A huge tree flourishing, many living beings find an abode and habitat in it. When the tree is burnt, those living beings are rendered homeless. Of all the literary expressions of trees and forests in vedic literature, the *aranyanisukt* (the hymn of the thick woods) of the Rig Veda is the most noteworthy. It is a small hymn, but it carries much value from literary and ecological angles. The frightening solitude of the wild and thick woods is given a beautiful expression.... The deep forest is extolled as the Universal mother, not harming anybody (unless it is afflicted), and providing sweet and healthy food (fruits) in plenty.”

Sundareswaran talked about agriculture and how its practice is extolled in the Rig Veda. “We get references to the foodgrains that are cultivated and are utilised to prepare different food items and sacrificial offerings,” he said. “Grains such as wheat, barley, and rice, cereals and seeds such as mustard and sesame are mentioned as part of rituals.”

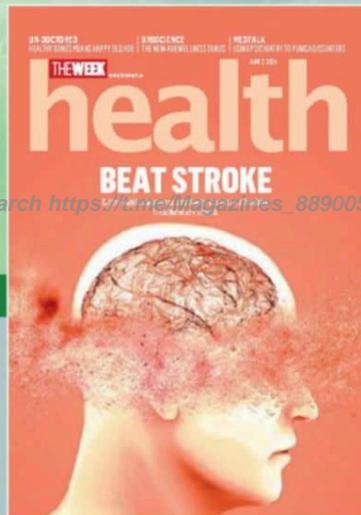
Retired professor Janarthanam addressed palm trees and disappearing traditions in south

India, while other experts such as Rajendra Kerkar and Dr Sindhu A. spoke about the tradition of sacred trees in Goa, medicinal trees and the ethno-medicinal flora of sacred groves. In the same context, Pillai spoke about his project, 'Vaman Vriksha Kala', a monograph focusing on the specialised subject of bonsai. The name of the book means 'The art of miniature trees'. The prime intention of the book, he said, was to firmly establish the fact that bonsai is originally an Indian art, as against the widely held belief that it belongs to China and Japan. “In the book, I have provided sufficient evidence from ancient Sanskrit texts to establish this claim that the art of bonsai has its roots in India, and why our ancestors reduced trees to potted size,” he said. “After I took charge as governor in July 2021, I had the occasion to visit Partagali Mutt in Canacona taluka. There I saw this 1,000-year banyan tree. It was then that I decided that one day I would return to worship this great tree. About a year later, I began the Saimik Daiz Yatra (journey to learn about heritage trees of Goa) and that is when I learnt about 30 more heritage trees, all of them between 100 and 500 years, spread out across Goa. Some amazing trees I found were *shidam*, *satvin*, *baobab*, and more. These trees constitute an integral part of people's socio-cultural association with nature and environment.” His yatra resulted in the writing and publication of *Heritage Trees of Goa*, which was released by the West Bengal Governor C.V. Ananda Bose last year.



provide dignity to the scholars and sustainability to those growing *samidha* and sacred flora. Livelihood opportunities in this sector should be explored. We should create dedicated libraries and research centres to simplify and ensure availability of vedic literature, plant-related knowledge and we should validate these by using modern scientific methods. People's Biodiversity Registers (PBRs), under the Biological Diversity Act, are under prepa-

# When you are touched by our stories, so are our writers

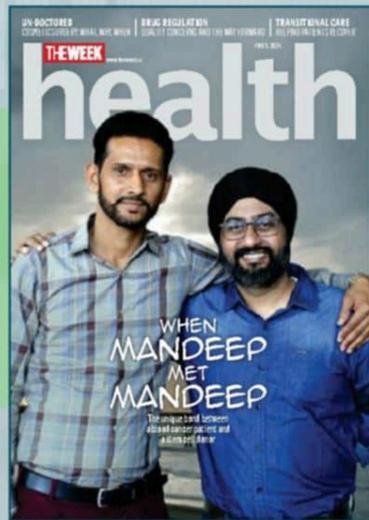


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**NIRMAL JOVIAL**

**W**hile working on the cover story on stroke care, I realised that inequality in access to health care is one of the most overlooked forms of inequality. Many lives, especially in rural areas, are lost to stroke simply because we lack a robust system capable of delivering the right care within the right time. This concern is amplified by the increasing number of young stroke patients. So much human potential is wasted owing to a condition whose ill-effects can be minimised if treated promptly!



*It was overwhelming to encapsulate the emotional journey of the two Mandeeps, unconnected by blood but connected by destiny. Cancer made its presence in the lives of both, although in different ways, and changed the course of their lives. How one Mandeep saved the other from the brink of death became my most loved story to work on. And, it gave me lessons in life I will carry with me forever.*



**POOJA BIRAIA JAISWAL**

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*The initial idea behind our cover story on air pollution was to examine if its impacts went beyond the lungs. That 'if' was not just a resounding but an astounding 'yes'. Though recorded evidence is not aplenty, correlations of air pollution's ill effects on the entire human body are too alarming to ignore. From our mental health to our skin, every bit of the body bears the brunt of the air we breathe, besides a reduction in the quality and years of life. Through its impact on fertility and the foetus, this is a generational worry. The time to tackle it was yesterday, for tomorrow might be too late.*



**By Dr S.N. Omkar**

yogaomkar@yahoo.com

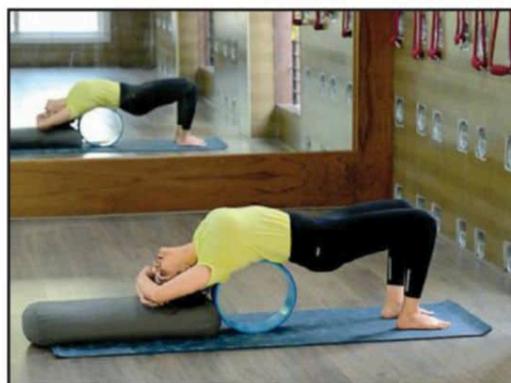
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- Sit cross-legged on a mat with an upright posture.
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- Position a cotton-studded bolster behind the wheel.
- Sit close to the wheel, ensuring the bolster is right next to it.
- Extend your legs forward with knees bent, and press your palms by the sides of the wheel.
- Raise your hips and slowly recline onto the wheel.
- Rest your upper back on the wheel and bend backward.
- May the crown of your head rest on the bolster.
- Fold your hands and place them on the bolster.
- You can stretch your arms straight on the bolster.
- Maintain the posture for around two minutes, breathing slowly and steadily.
- Slowly lower your hips and return to an upright position.
- Repeat the posture, and relax.

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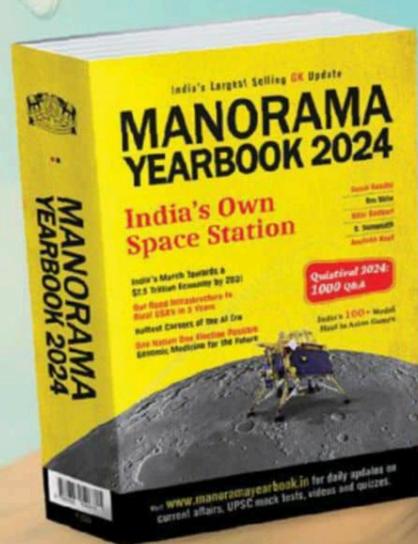
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हनिदी मैगजीन

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