

# Eye drops could dissolve cataracts, finds study (ScieTech, Health)

Drops first tested on rabbits and dogs

A study has found out that an eye drop that was tested on rabbits and dogs can dissolve cataracts, the most common cause of blindness in humans, implying that they could one day be cured without surgery.

The study, conducted by researcher Kang Zhang of Sun Yat-sen University in Guangzhou found that a naturally-occurring molecule called lanosterol, administered with an eye dropper, shrank cataracts in rabbits and dogs, an AFP report said.

Currently, the only treatment available for cataracts, which are growths of dead cells, is surgery. While surgery is generally simple and safe, the number of people who need it is set to double in the next 20 years as populations age. And for many, it remains prohibitively costly.

Zhang began his study with two children, both from families beset with a congenital, or inherited, form of cataracts. He found out that his patients shared a mutation in a gene critical for producing lanosterol, which the researcher and his team suspected might impede cataract-forming proteins from clumping in normal eyes.

In a first set of lab experiments on cells, the researchers confirmed that lanosterol helped ward off the proteins.

In subsequent tests, dogs with naturally-occurring cataracts received eye drops containing the molecule.

After six weeks of treatment, the size and characteristic cloudiness of the cataracts had decreased, the researchers reported.

“Our study identifies lanosterol as a key molecule in the prevention of lens protein aggregation and points to a novel strategy for cataract

prevention and treatment,” the authors concluded, according to the AFP report.

Cataracts account for half of blindness cases worldwide. However, other scientists feel that the results are very preliminary.

“These are very preliminary findings,” J Fielding Hejtmancik, a scientist at the US National Eye Institute, told AFP.

“Before there are any human trials, the scientists will probably test other molecules to see if they might work even better,” he added.

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## **Why does HIV progress slowly in some people, even without therapy? [Hindu SciTech, Health]**

It might have something to do with enhanced cholesterol metabolism in certain immune cells

Even in the absence of HIV therapy, some HIV-infected people may not suffer from AIDS for many years due to enhanced cholesterol metabolism in certain immune cells, shows research. And this, is an inherited trait.

The findings may lead to potential development of new approaches to control HIV infection by regulating cellular cholesterol metabolism. “We have known for two decades that some people do not have the dramatic loss in their T-cells and progression to AIDS that you would expect without drug therapy,” said lead author Giovanna Rappocciolo, assistant professor at University of Pittsburgh in the US.

T-cells are a type of white blood cells that play a very

important role in human immunity by scanning for cellular infections. “Instead, the disease progresses more slowly and we believe altered cholesterol metabolism in certain immune cells may be a reason,” Mr. Rappocciolo said.

These people are known as “nonprogressors.” This discovery was made possible by using 30 years of data and biologic specimens. Mr. Rappocciolo and her colleagues searched for patterns in gene expression, or the degree to which specific genes are turned on or off.

“These results improve understanding of how nonprogressors control HIV without drug therapy and potentially may contribute to new approaches to manage HIV infection,” Mr. Rappocciolo added. The findings were presented at the eighth International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention in Vancouver, Canada.

Keywords: HIV, T-Cells, AIDS, Cholesterol metabolism

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## **Colour-changing condom can help detect sexually transmitted infection (DTE, Health)**

*Molecules in the condom react with bacteria in the infection, triggering a change in colour on both sides of the condom*



For representation purpose only (Photo: Dedi Efendi/Flickr)

A group of students at the Isaac Newton Academy in Essex, England, have invented a “smart” condom to detect sexually transmitted infection (STI) in the wearer.

Called S.T.Eye, the latex condom is covered with antibodies that would react with the bacteria found in STIs, triggering a change of colour. This would occur on both sides of the condom. In the presence of STI, the condom would turn green for chlamydia, purple for genital warts, blue for syphilis and yellow for herpes.

The idea, which is still at the concept stage, is the brainchild of Daanyaal Ali (14), Chirag Shah (14) and Muaz Nawaz (13), who won the TeenTech award this week for their proposal. The competition encourages 11-16-year-olds to create "technology to make life better, simpler or easier", and includes prize money of £1,571 and a trip to Buckingham Palace.

The winners told BBC Newsbeat that they took inspiration from an HIV testing method called Elisa which utilises colour-changing technique. "Once the bodily fluids come into contact with the latex, if the person does have some sort of STI, it will cause a reaction through antibodies and antigens hanging on to each other, which triggers an antibody reaction causing a colour change," Ali explained. They wanted to make detecting harmful STIs safer and easier, in the comfort of one's home and without the embarrassment of going to a clinic. "We noticed how big the condom market was—there were over 4,50,000 STI cases in England in 2013 alone," Ali said.

The young students have already been contacted by a condom company who is keen on developing the concept further. "The technology for colour change in the presence of an antigen is certainly something that does happen. It normally requires some additional chemicals in that process and with a condom you would obviously need to make sure that those chemicals are not going to be harmful or toxic or in any way cause irritation," Mark Lawton, a consultant in sexual health and HIV at the Royal Liverpool Hospital, told BBC.

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**Exposure to toxic parts of PM2.5 during pregnancy harmful for newborn health (DTE , Pollution, Health , GS**

# paper 3 )

Inhaling sulphur, sulphate, copper, iron, nickel and zinc through PM2.5 can trigger maternal oxidative stress and affect the growth of the foetus

✘ Photo: Sayantoni Palchoudhuri

A new study conducted in Europe has found that maternal exposure to particulate matter (PM) constituents such as sulphur and secondary combustion particles may adversely affect birth weight and head circumference of newborns. LBW (birth weight less than 2.5 kg) is a predictor of infant morbidity and mortality.

A mere 200 nanogramme per cubic metre-increase in sulphur in PM2.5 is found to be associated with an increased risk of low birth weight (LBW). Nickel and zinc in PM2.5 concentrations were also associated with this outcome.

The study—[Elemental Constituents of Particulate Matter and Newborn's Size in Eight European Cohorts](#)—published in Environmental Health Perspective examined the associations of eight elemental constituents in PM2.5 and PM10. It assessed data of 34,923 births during 1994 to 2008 in Europe and estimated the annual average concentrations of eight constituents of PM2.5 and PM10

including copper,  
iron, potassium, nickel, sulphur, silicon, vanadium and zinc  
at  
maternal homes in different parts of Europe during pregnancy.

It was found that exposure to specific constituents of PM<sub>2.5</sub>,  
especially traffic-related particles, sulphur constituents,  
and metals  
was associated with decreased birth weight. Inhalation of PM  
can trigger  
maternal oxidative stress, damage cells, cause inflammation  
and changes  
in the blood system, decrease placental blood flow, disrupt  
transplacental oxygenation, leading to poor growth of the  
foetus.

The study also found that all the elemental components, with  
the  
exception of potassium, were significantly associated with  
smaller head  
circumference in newborns. Head circumference is associated  
with  
cognitive ability and child intellectual quotient.

The study was led by scientists from Centre for Research in  
Environmental Epidemiology, Barcelona, Spain, and jointly  
carried out by  
several research institutions.

In India, it is often stated that PM from crustal sources  
(such as  
dust) is largely responsible for poor air quality in cities  
like Delhi.

But emerging evidence, such as the findings of this study,  
makes it  
imperative for regulators to also look into the effects of  
finer toxic  
constituents of combustion sources in PM

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# **Cleaner air could save 1.4 million lives in India, China( Pollution, GS paper 3, Health, The Hindu)**

At the present rate, deaths per capita from air pollution would increase 20 to 30 per cent during the next 15 years in the two countries.

Improving air quality could prevent up to 1.4 million premature deaths per year in polluted countries such as China and India, a new study has found.

The study also warned that with no changes in air pollution, deaths per capita from air pollution would increase 20 to 30 per cent during the next 15 years in India and China. If also accounting for population growth, the increase in deaths would be even greater if those countries experience no change in air pollution, researchers said.

WHO guidelines

The researchers found that meeting the World Health Organisation's (WHO) particulate air quality guidelines could prevent 2.1 million deaths per year related to outdoor air pollution worldwide.

Joshua S. Apte of the Cockrell School of Engineering at The University of Texas Austin and his team looked at outdoor air pollution from particulate matter (PM) smaller than 2.5 microns.

Those particles can enter deep into the lungs. Breathing PM is associated with increased risk of heart attack, stroke and other cardiovascular disease; respiratory illnesses such as emphysema; and cancer.

"We wanted to determine how much cleaner different parts of

the world would need to be in order to substantially reduce death from particulate matter,” said Apte, lead author of the study published in the journal Environmental Science & Technology.

The study used the Institute of Health Metrics and Evaluation’s Global Burden of Disease 2010 database, estimates of PM concentrations derived from ground-based measurements, satellite observations and air pollution models, and WHO’s air quality guidelines.

Worldwide, most people live in areas with PM concentrations far above WHO’s air quality guideline of 10 microgrammes per cubic metre, with some parts of India and China experiencing levels that exceed 100.

The study demonstrated major potential to reduce mortality from PM in the world’s most polluted regions.

One of the study’s unexpected findings was that cleaning air in less polluted parts of the world, including in North America and Western Europe, can have as much health benefit as similar measures taken in the most polluted areas.

The study determined that meeting WHO’s air quality guidelines could prevent up to 1.4 million premature deaths per year in polluted areas such as China and India.

Meeting WHO guidelines in clean regions could reduce premature deaths from outdoor pollution by more than half a million deaths per year.

Another important finding is that because of ageing populations, health risks in many countries will increase even if pollution levels are constant.

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**Know What you are eating**

# . (Science and Tech, Business Line)

MSG, stabilisers, emulsifiers, preservatives ... how they help processed food, and may or may not help you

Have you ever looked at the list of ingredients on a packet of processed food? It seems like an interminable list – yeast extract, emulsifiers, stabilisers, class II preservatives, high fructose corn syrup, acidity regulator, anti-caking agents, so on and so forth. What are these and what do they mean? The recent controversy over Maggi noodles must have piqued your curiosity. Here's what some of them are, and what they are meant to do to the food we consume.

**MSG (monosodium glutamate):** This is a flavour enhancer, whose popularity has been on the wane for quite a while now.

The US FDA says it is “generally recognised as safe” but it gets a bad rap for causing headaches, stomach upsets and allergies and symptoms known as the Chinese Restaurant Syndrome. Depending on the laws in various countries, processed food companies can declare that their food contains no added MSG, but it is present in other additives such as hydrolysed groundnut protein, maltodextrin and autolysed yeast.

**Yeast extract:** This is considered a condiment rather than a flavour enhancer but it contains glutamate as well. It is used to give a savoury taste to soups, sauces and savoury snacks. It can sometimes be included in the label ‘natural flavour’. Marmite and Vegemite are well-known spreads made from yeast extract.

**Emulsifiers:** These food additives help contrary elements like oil and water mix together, and are crucial to the consistency and texture of processed food including ice-cream, chocolate, bread, creamy sauces, confectionery and bakery products.

Some of the well known emulsifiers are egg yolk, soy lecithin, monoglycerides and diglycerides, polysorbates, and sorbitan monostearate. They too are generally regarded as safe but research published by Nature in February 2015 stated that in a study done on mice, they were found to have affected their metabolism and made them prone to inflammatory bowel disease.

**Stabilisers:** These are additives used to maintain the consistency and prevent the separation of ingredients bound by emulsifiers. They are used in ice-cream, margarine, low-fat spreads and dairy products.

Popular stabilisers are alginic acid, guar gum, xanthan gum, gelatine, carrageenan, pectin or calcium chloride.

**Acidity regulator:** This is an element that controls the pH level of a food, which determines the extent of its acidity or alkalinity, which affect taste and food safety. Not regulating these elements might lead to bacterial growth, which is a health hazard. Citric, lactic, fumaric, tartaric and malic acids are some well known acidity regulators.

**Class II preservatives:** Chemical food preservatives are added to processed food to extend its shelf life. (Natural preservatives such as salt and vinegar are Class I.) They retard the activity of germs and insects or kill them, keeping foods from going rancid or getting contaminated. The use of benzoates, butylates and butylated hydroxyanisole above the prescribed limits is reputed to cause a host of ailments including allergies, asthma, brain, kidney and liver damage, high blood pressure and cholesterol.

Says Dharini Krishnan, Chennai-based dietitian and chairperson of the Registered Dietitian Board, "Additives can be had in permissible quantities, but if you eat only out of packets, sodium and potassium levels go up. A 200 ml bowl of fresh soup will contain 2 mg of sodium but soup reconstituted from a packet will contain 20 mg." She explains that in Japan, where

commercial MSG was developed in 1908, it is recommended as a flavouring agent in place of salt but that elsewhere, as in India, users tend to use them together, which raises sodium in consumers to unhealthy levels.

(Sources: [www.fda.gov](http://www.fda.gov), [eufic.org](http://eufic.org), [faia.org](http://faia.org), [foodadditivesworld.com](http://foodadditivesworld.com) and [yeastextract.info](http://yeastextract.info))

Vitamin C is a weekly dose of consumer empowerment

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## **Why people die of heat stroke? All you need to know about the illness (Health, IndianExpress, In News)**

There was a 61% increase in the number of deaths due to heat stroke across India between 2004 to 2013, according to National Crime Records Bureau (NCRB) data, with indications that these numbers represent a vast under-reporting and often misdiagnosed.

Heat illness may be viewed as a range of ailments related to the body's inability to cope with heat. It includes minor problems such as heat rash (prickly heat), heat cramps, and heat exhaustion. Heat stroke is the most severe form and is defined as a body temperature higher than 41.1°C (106°F) associated with neurological (brain) dysfunction.

Exertional heat stroke (EHS) generally occurs in young individuals who engage in strenuous physical activity for a prolonged period of time in a hot and sometimes even in a not-

so-hot environment. It can start as heat cramps that can be completely disabling and typically occur during or after hard work and are caused by electrolyte deficiencies that result from extended periods of intense sweating. Symptoms include painful spasms of leg, arm or abdominal muscles, heavy sweating and thirst. Drinking plenty of water or electrolyte fluids are the suitable first aid.

EHS happens when the individual's capacity to dissipate or drive away the heat produced by overactive muscles falls short. The temperature rises to such high that the body becomes a pressure cooker and starts (am tempted to say) cooking our internal organs, inflicting severe tissue damage resulting into multi-organ failure. We frequently read news about young men (and women) collapsing and dying with no apparent reason when made to undergo severe physical exertion for endurance tests during recruitment in the Indian police force or military.

High (body) core temperatures damage the internal organs, especially the brain. The main reason is the fluid loss in the form of sweat, sometimes even 'one and half' liter in one hour and three liters in two hours. Along with sweat we also lose electrolytes. Enormous fluid loss can also lead to dangerously low blood volume and lead to dangerously low blood pressure. This can break down the body's cooling system that demands increased blood flow to the skin to take away the heat from body's core. Electrolyte imbalance adds insult to injury, causing irregularities in heart function. Most people who are killed by heat stroke die when their heart stops pumping effectively (mostly the cause of death is written as 'heart failure, or cardiac arrest and that is why heatstroke death numbers seem so low). Even people who survive are likely to have permanent brain damage if their core temperature has been over 40.6°C (105°F) for more than an hour or two.

The risk factors for EHS in such young men and women depend on the number of active sweat-glands, acclimatization, outside temperature, humidity, hydration status and activity-related factors (duration of exercise). Acclimatization means gradual introduction of a sports person or a worker to the 'outdoor' task.

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## **Expert bodies suggest measures to fight killer heat waves (DownToEarth , Health, GS Paper 2)**

Long-term planning, combined with immediate preventive measures, can be the key. More than 2,000 people have died in India's current heat wave, the second deadliest in the country's history. Amid fears of more lives being lost, two international expert bodies have issued a set of recommendations to battle the heat. Telangana and Andhra Pradesh are the worst hit states in the country.

The guidelines, given by the World Meteorological Organization (WMO) and World Health Organization (WHO), are expected to have global applicability.

According to the guidelines, over the period 2000–2011, southern and eastern Asia and the European Region were particularly affected by the heat waves. However, heat as a health problem is not new in some of these areas. Over the period 1990–1999, significant heat wave events occurred in a few of the countries in the region. In India's Odisha, the wave resulted in an estimated 558 and 2 541 deaths in years 1995 and 1998 respectively. Similarly, Pakistan lost almost 523 lives to the wave in 1995 and USA's Chicago reported 670 deaths in the same year.

Apart from these most-affected regions, countries like Australia and Mexico have also reported deaths. While Mexico recorded 380 deaths in April 1990, heat wave events occurred in Australia in 1993, 1994 and 1995 and 2009, with the 2009 event of south-eastern Australia resulting in more than 300 deaths and widespread disruption.

The recommendations further suggest that behaviour of people has a principal

effect on exposure, but may also affect sensitivity. People who over exert during work or leisure may become dehydrated and therefore become more susceptible to heat illness and death. Similarly, very young or very old people may be at increased risk due to inadequate fluid intake or inadequate behaviour such as neglecting protective measures. That behaviour is important and has been demonstrated in studies showing that protective actions such as dressing lightly, using cooling techniques like extra showers/baths or visits to air-conditioned places, increasing social contact and having home air-conditioning tend to reduce the risk of death during a heat wave.

Along with suggesting long term planning, the guidance also gives tips for dealing with heat waves. Most of these tips are for workers.

### **Tips to fight heat wave**

- Encourage workers to drink plenty of water – about one cup of cool water every 15 to 20 minutes, even if they are not thirsty – and to avoid alcohol, coffee, tea and caffeinated soft drinks that dehydrate the body
- Help workers adjust to the heat by assigning a lighter workload and longer rest periods for the first five to seven days of intense heat. This process needs to start all over again when a worker returns from vacation or other absence
- Encourage workers to wear lightweight, light-colored, loose-fitting clothing. Workers should change their clothes if they get completely saturated
- Use general ventilation and spot cooling at points of high heat production. Good airflow increases evaporation and cooling of the skin
- Train first-aid workers to recognise and treat the signs of heat stress and ensure that all workers know who have been trained to provide such aid. Train supervisors to detect early signs of heat-related illness and permit workers to interrupt their work if they become extremely uncomfortable
- Consider a worker's physical condition when determining fitness to work in hot environments. Obesity, lack of conditioning, pregnancy and inadequate rest can increase susceptibility to heat stress
- Alternate work and rest periods, with rest periods in a cooler area. Shorter, more frequent work-rest cycles are best. Schedule heavy work for cooler times of the day and use appropriate protective clothing
- Monitor temperatures, humidity, and workers' responses to heat, at least hourly.

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# Coping with the heat (Hindu , India heatwave, health)

Extreme weather conditions have become such a part of life all across the world over the last decade and more, that ways and means to understand and cope with them have become an essential element of survival strategies. Heatwaves in summer, cold waves in winter and extreme rainfall when it is least expected have almost become the norm. Each of these rounds takes its own toll on lives and livelihoods even as those in other areas are forced to stand as mute spectators. This summer in India, the number of lives lost to heatwave conditions has exceeded 2,000. While shrinking winter-spans are considered by specialists as a sure sign that climate change is a reality we cannot ignore, at the other end of the spectrum, hot summers are no less debilitating. Prediction of these phenomena is itself so difficult, not for lack of effort but because of the theoretical limitations of the models being used in the calculations. Broadly speaking, there is no doubt that summer heat is worsening by the year in parts of India. This fact is reflected in some climate studies. For instance, one on climate in the subcontinent over the period from 1961 to 2010 by scientists of the India Meteorological Department based in Pune and Chennai, found that compared to the first four decades, the number of heat-wave (HW) days per season was higher during 2001-2010 in many parts of north, north-west and central India. An increase was observed in the number of severe-heat-wave (SHW) days per season in some stations, mainly in north-west India. The study also found that the frequency, persistence and area coverage of HW/SHW days were more than average in years succeeding El Niño years. The question remains whether humankind is preparing for eventualities such as this. For those in denial of climate change, there are clear pointers that cannot be ignored. Also, from the point of view of disaster mitigation, the rising number of heatwave related deaths should serve as an urgent

signal to develop innovative methods to control summer-time losses. It is somewhat ironical that while the long, hot summer takes such a toll, in this subcontinent it is also a necessary condition for the monsoon to set in and provide adequate rainfall. In a sense, the unendurable heat and the rains that follow are tied together in a delicate balance. While it is important to preserve this balance by focussing on factors to mitigate climate change, it is also necessary to develop methods to cope with the impact of each of these when they go beyond normal.

Keywords: India heatwave, heatwave, extreme weather conditions

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## **Scanning kidneys becomes easy( Sci-tech,Health ,**

*Preliminary results have been published recently in the 2014 IEEE 16th International Conference on e-Health Networking, Applications and Services*

Thanks to software developed by IIT Hyderabad researchers, semi-skilled persons can use an ultrasound imaging device to perform preliminary diagnosis to classify a kidney as either normal or abnormal in terms of stones, cysts, or bacterial infection. When fully functional, the imaging system developed by a team led by Prof. P. Rajalakshmi, Department of Electrical Engineering, IIT Hyderabad can provide a fillip to healthcare in rural and remote areas where lack of trained sonologists has become a norm.

Preliminary results have been published recently in the 2014 IEEE 16th International Conference on e-Health Networking, Applications and Services (Healthcom).

Unlike in the case of the sphygmomanometer (blood pressure measuring instrument) or ECG, only skilled people can use an ultrasound probe to get the desired information. The very objective of Prof. Rajalakshmi's work was therefore to turn the device into one that can be operated by semi-skilled people.

To do that, a six-second ultrasound video is converted into images – 15 frames per second. An organ validation algorithm developed by the team then checks each frame to see if useful information has been acquired. The algorithm was

developed based on ultrasound videos of kidney collected by sonographers. "The system alerts the operator to rescan the organ when partial data or useful data is not available," she said. "We have developed a novel organ validation algorithm for kidney but it can be expanded to other organs too."

Once the organ validation is performed, a CAD algorithm does a preliminary diagnosis to classify the kidney as normal or abnormal. "The length of the kidney, the textural features and first and second order statistics are applied to classify a kidney as normal or abnormal," said Prof. Rajalakshmi. The abnormality could be a stone, a cyst or bacterial infection. The algorithm only classifies the organ as normal or abnormal and does not say what the abnormality is.

Though 32 features extracted come under the first and second order statistics, the team found kidney classification can be based on fewer features. "Our analysis shows that only 10 features are needed to classify a kidney as normal or not," she said.

The valid images are uploaded to the cloud and information on whether the kidney image is normal or not is also tagged along with the image.

The good news is that the organ validation algorithm and CAD can be integrated with ultrasound machines.

Keywords: 2014 IEEE 16th International Conference, e-Health Networking