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# Editor's Note

Hello Readers !!!

It is a great pleasure to launch the last issue for the year 2021. Apart from covering conventional informative scientific articles, the issue also features brain storming section, I encourage the readers to participate in it. I would like to congratulate the winner of Mind Lab of our previous issue & would like to personally thank Dr. K. Saminathan & Dr. Beulah Elsa Thomas for their contribution for this issue and to all other contributors for having put their thoughts and experiences into an engaging read. Wishing you all a very happy new year – 2022 !!

For any queries, suggestions, feedback or submission of articles, please do not hesitate to contact our team via [fphpanpharmacon@gmail.com](mailto:fphpanpharmacon@gmail.com). We would love to hear from you and elevate the quality of the newsletter to serve you better. Happy reading !!!



Dr. J. Anbu

Editor-Panpharmacon

## Acknowledgement

Team Panpharmacon is very much thankful to RUAS management for providing a wonderful platform to explore and utilise our knowledge and skills. We wish to thank our Hon'ble Vice-Chancellor and Pro-Vice Chancellors for patronage and advising us on the importance of enhancing the visibility of workplace that stimulated us to come out with informative Panpharmacon, an E – Newsletter. We also thank all our colleagues, well wishers and friends for supporting us in making this newsletter.



# THE DEVIL'S BREATH: FALLING PREY TO THE ZOMBIFYING PILL

After pocketing a drug-soaked business card from a stranger, many travelers have often ended up waking up the next day with no remembrance of withdrawing their full life savings and giving it away. No wonder it's apt name, "The Devil's Breath" as it is infamously called as!

Although, it is not all predatory and has significant pharmacotherapeutic use as an anti-nauseatic in the treatment of morning sickness, Scopolamine is a widely unreputed name for thousands of hoaxes that are committed under its influence in Ecuador, Columbia, Paris, and basically all tourist spots. Multiple species of the *Brugmansia* genus that are known to be "The Devil's Breath's", foundation is primarily widespread in South America which makes it the hotspot for most scopolamine-related crimes.

From robberies to sexual assaults, and even zombifying the prey to pull a trigger on someone, criminals use this drug in the most terrifying ways you can possibly think of. Moreover, what's even interesting is that there remains no detectable trace in the body, so no one can ever know what happened. In fact, the US Overseas Security Advisory Council points towards 55000+ such hoaxes occurring per annum. This figure is just an official number since scopolamine cannot be detected in the body after its effect subsides. The molecule easily escapes predatory drug detection techniques used in forensic analysis which makes it one of the most dangerous drugs in the world.

Its primary function is to competitively inhibit acetylcholine functions in the body and suppress its actions throughout all body organs. However, its hallucinogenic property is what makes it one of the most popular predatory drugs of choice among criminals. On the other side, as you can never imagine, the administration is as easy and unperceivable as it can be - through a small handshake, an exchange of a drug-soaked business card, spiked drinks, or just simply making the prey 'accidentally' inhale the powder.

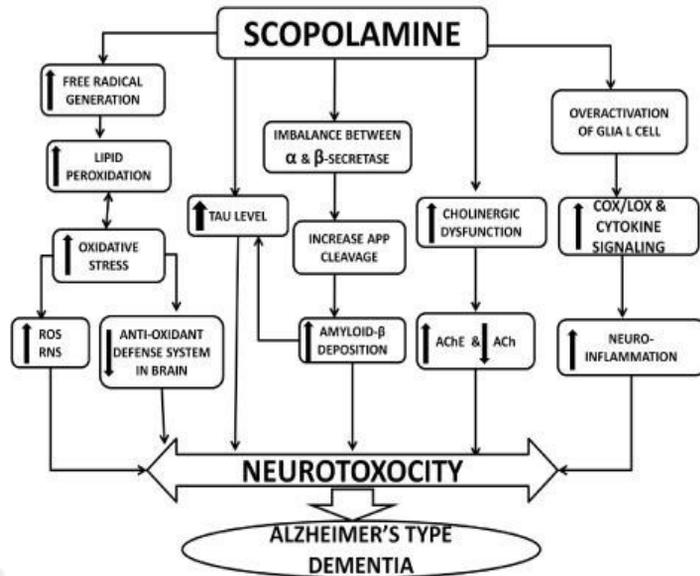


Image courtesy: <https://austinpublishinggroup.com/clinical-neurology/fulltext/ajcn-v2-id1053.php>

**Fig: Effect of Scopolamine on Nervous system**

The drug readily gets absorbed through the skin (if touched) or through the nasal mucosa (if inhaled) to almost immediately take away memory as well as free will. The effects encompass strong hallucination, drowsiness, inability to create new memories, anterograde amnesia, and of course, loss of free will. The attacker may then willingly make you withdraw money from an ATM, hand over your entire bank balance, convince you into giving away your valuables, and even murder someone!



**"I'm Physostigmine an antidote for Devil's Breath"**



The victims do not remember anything by the time the drug's effects subside for them to actually file a complaint. The Devil's breath incapacitates victims for prolonged hours (and even a day) which implies it's almost impossible to beat the infamous scopolamine clock. However, Physostigmine is often used in incidences of scopolamine overdose as it is a choline-esterase inhibitor and can easily cross the BBB to neutralize scopolamine's effects.

Thus, next time you are traveling and someone comes too close to you or asks for a location, remember the two biggest lessons of the pandemic - 'social distancing' and 'mask up' (N95) - that can save your life.

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Vallersnes, O.M., et al., (2009). Epidemic of poisoning caused by scopolamine disguised as rohypnol tablets. *J Clin Toxicol*, 47(9). pp. 889–93.

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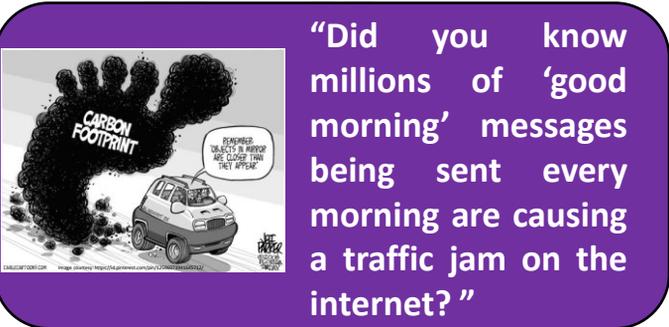




# CARBON FOOTPRINT OF THE DIGITAL ERA

**HAVE YOU EVER THOUGHT ABOUT THE DIGITAL CARBON FOOTPRINT OF YOUR DAILY ONLINE ACTIVITY?** Ever wondered how much energy it takes to store an email?

It is the world full of ideas, opinions, learning and opportunities, only because of the Internet has made it possible. This is just the beginning, there are many more that lies in the digital world that the previous generation couldn't even think about. Smartphone penetration rate is at an all time high so is the technology adoption rate. India's large, connected population is projected to reach up to 700 million smartphone users and 840 million internet users by 2023.



**“Did you know millions of ‘good morning’ messages being sent every morning are causing a traffic jam on the internet?”**

In the context of rapidly improving technology and falling data costs, technology-enabled business models could become pervasive over the next decade which will likely create significant economic value. With COVID-19 regulations in place internationally, our dependence on digital technology sky-rocketed in the year 2020 as video conversations, emails, instant messaging and virtual entertainment substituted face-to-face contacts in and out of the office but all these internet traffic and digitalization is taking a toll on the environment, let us dive into some numbers.

We all overlook the fact that even an ignored unopened mail that is lying idle in your mailbox contributes to global warming.

There are over 4.66 billion active internet users worldwide (2021) i.e, around 60 per cent of the global population and it is evident that in the last two decades, digitalization has had a positive impact on the environment. Still, the Internet does not come out of nothing, and even the adoption of every digital service – from teleconferencing to YouTube videos to Bitcoin mining exacts a cost in emissions.

Between February and April 2020, at the peak of worldwide lockdowns, global internet traffic soared by about 40%, which was driven by video conferencing, online gaming, streaming and social media.

You probably have a favourite gaming console, whether you're a competent gamer or just like to play once in a while. Have you thought about the environmental impact of your favourite game and the gaming console? Green Gaming discloses the emissions of popular consoles and video games in order to inspire more environmentally friendly behaviour.

#	GAMES CONSOLE	SALES FIGURES	KWH	KG CO2e* PER HOUR	TOTAL CO2e EMISSIONS (per hour)
1	PlayStation 3	87,400,000	0.185	0.043	3,758,200.00 kg CO2e
2	Xbox 360	84,000,000	0.18	0.042	3,528,000.00 kg CO2e
3	PlayStation 5	13,400,000	0.2	0.047	629,800.00 kg CO2e
4	Nintendo Switch	92,870,000	0.014	0.003	278,610.00 kg CO2e
5	Xbox Series X/S	8,000,000	0.092	0.021	168,000.00 kg CO2e
6	Wii U	13,560,000	0.032	0.007	94,920.00 kg CO2e
7	PlayStation 4	102,490,000	0.12	0.028	2,869.72 kg CO2e
8	Xbox One	51,000,000	0.095	0.022	1,122.00 kg CO2e

Image Source: PC Mag

For every hour each sold PlayStation is played an enormous 3.8 million Kg CO<sub>2</sub> is emitted.



The extraction and processing of raw materials, transportation, and the massive factories in which the PlayStation 4 is built has emitted around 8.9 billion kilograms of carbon dioxide into the environment since the PlayStation 4 was released in 2013. That's more than the whole emissions output of Jamaica in 2017!

According to the International Energy Agency (IEA), web traffic is anticipated to quadruple by 2022, with mobile internet users, which is expected to elevate to 5 billion by 2025 from 3.8 billion last year. All these online activities need to be powered by electricity, raising the question of whether it could contribute to a boom in planet-heating emissions, now and in the future.

Did you know that millions of 'good morning' messages being sent every morning are causing a traffic jam on the internet? A massive country like India has an abundance of smartphone users and, as anyone with family on WhatsApp will know, 'greeting' messages are some of the most forwarded media on the platform.

Did you know the text-based emails emit about 4 grams of CO<sub>2</sub>e (carbon dioxide equivalent). Various sources also estimate that an average year of emailing emits about 136 kilograms of CO<sub>2</sub>e, which is about the same impact as driving 200 miles in a gas-powered car, solely by the electricity consumption derived from non-renewable sources.

As of 2020, 306.4 billion emails were sent per day. According to The Good Planet, nearly 107 billion spam emails were sent and received a day. If every person only deleted 10 of those emails, they could save 1,725,00 gigabytes of storage space and around 55.2 million kilowatts of power that would cut 39,035 metric tonnes of CO<sub>2</sub>e which equates to 19356 tonnes of coal that is burned every day

In 2020, the number of email users reached 4 billion, which means that over 50% of the world's population was using email.

The latest reported number in 2021 showed increase to 4.1 billion. For the next three years, the predicted user growth rate is 3%, or around 100 million more each year. So, in 2024, the number of email users worldwide should be approximately 4.5 billion. Therefore, digital behaviour of each of us can make the difference.

Have you ever wondered how binge watching your favourite show on OTT platforms take a toll on the environment? Let us look at some interesting statistics on watching Netflix. A full binge of Breaking Bad would come to 61.3 hours at 71.49g CO<sub>2</sub> per hour, so a total of 4.382kg of CO<sub>2</sub>.

According to the International Energy Agency, China emits 9.3GT CO<sub>2</sub>, the United States following up with 4.8GT, and India with 2.2GT. Russia Federation, Japan, Germany, and South Korea are below 2.0 GT.

Simple means to reduce emissions in everyday digital life:

- Reduce streaming - Video streaming causes 75 percent of global data traffic Production of the device (smartphone, laptop, TV), internet network energy consumption, several involved data centres and servers/routers, energy consumption use of device during streaming itself. By comparison downloading is much less energy-intensive.
- Play songs as audio files rather than streaming them as a video on YouTube or watch the video at a lower resolution
- Use the gadgets longer
- Dispose old devices correctly
- Store data locally, use the cloud as little as possible
- Unsubscribe from emails you don't need, delete spam emails, don't sign up for newsletters you aren't going to read, and delete emails after reading them
- Reduce the size of emails by lowering the resolution and compressing images and avoid large HTML elements



- Link to files or information online rather than adding an attachment

Given the advancements and resources which continue supporting the increase in data volume and faster speeds, we should be arguing whether kind of digital services are truly important to society. It's fantastic that keeping in touch with close friends and family is so simple from practically anywhere on the planet.

Can we really justify the energy usage involved in streaming entertainment videos in ever-higher definition at a time when we're fighting to keep carbon emissions under control? In the recently concluded CoP-26 Summit India committed to

becoming carbon zero by 2070, China by 2060 EU and the US by 2050, the management of the paradox remains a question.

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Andrew K., (2021). Deleting Emails Might Help Lower Your Carbon Footprint. Available at: <https://www.greenmatters.com/p/do-emails-leave-carbon-footprint> (Accessed: 14 Dec 2021).

Nick G., (2021). How Many Emails Are Sent per Day in 2021?. Available at: <https://review42.com/resources/how-many-emails-are-sent-per-day/> (Accessed: 14 Dec 2021).

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# NON-HORMONAL TREATMENT TARGET IN ENDOMETRIOSIS

Endometriosis is a disorder which causes infertility in females of reproductive age and is characterized by pelvic pain. It has the potential to invade organs other than the uterus also.

Although there is no cure for endometriosis, there are treatments for the pain and infertility it causes. The existing treatment for endometriosis includes either surgically removing the lesions of the endometrium or hormonal therapy. But either of the treatments comes along with its own sets of side effects and the results are not satisfactory. Laparoscopy and laparotomy are the preferred surgical procedures, which mainly aim at removing the lesions and endometriosis patches, but it relapses at a rate of 20% to 40%. Endometriosis-related pain can also be treated by administration of hormonal medications, like Gonadotropin-Releasing Hormone (GnRH), oral contraceptives, progesterone, and progestin. Hormonal treatments limit the ovulation by preventing the ovaries from releasing hormones, particularly estrogen, which may assist in slowing the growth and local activity of the endometrium and endometrial lesions and hence help in reducing the symptoms. Nevertheless, the major disadvantages of hormonal therapy are that the symptoms of endometriosis recur once the therapy is discontinued.

Being inheritable, endometriosis is estimated to afflict 5% to 10% of the population in Western nations; however, it is suspected that the prevalence of endometriosis is higher in Asian women, affecting roughly 15% of them. In India, it is estimated that 25 million women suffer from endometriosis. In the year 2015, a study was carried out on 32 families, each having more than three patients with endometriosis. This study indicated a genetic link between endometriosis and human chromosome region i.e., 7p13-15.

Recent studies reported Neuropeptide S receptor 1- (NPSR1) as a non-hormonal treatment target in endometriosis. Variations in the NPSR1 gene are involved with many inflammatory conditions including asthma, inflammatory bowel disease, allergies, rheumatoid arthritis, and reoccurring abdominal pain.

A simultaneous investigation of endometriosis was carried out in humans and *Rhesus macaques* (*Macaca mulatta*), which led to the discovery of NPSR1. DNA of 849 macaques, out of which 135 macaques had fostered spontaneous endometriosis, were sequenced and it was identified that a variation in the gene NPSR1 that is located on 7p13-15 chromosome augments the risk of suffering from the late-stage endometriosis.

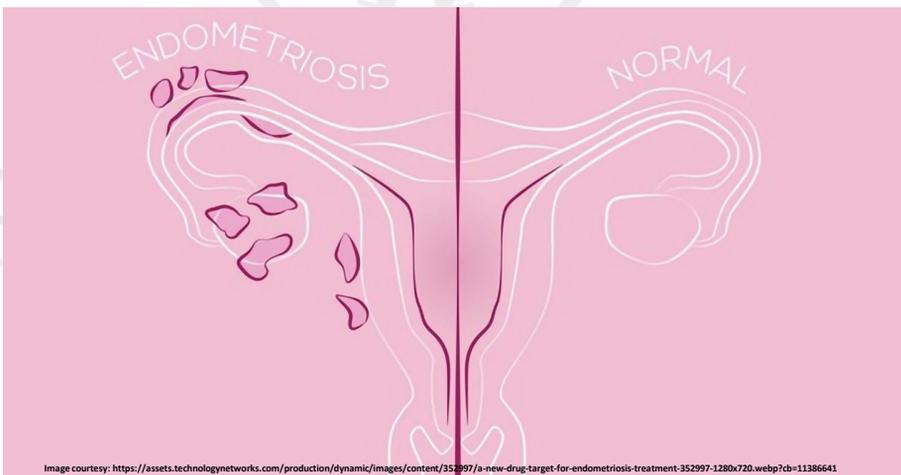
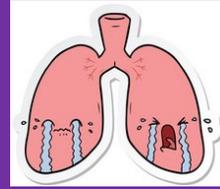


Image courtesy: <https://assets.technologynetworks.com/production/dynamic/images/content/352997/a-new-drug-target-for-endometriosis-treatment-352997-1280x720.webp?cb=11386641>



Researchers from Oxford University, sequenced the DNA of 11,000 women together with 3000 women with endometriosis to assess this genetic variation in human beings. They came to a conclusion when they discovered a link between stage III/IV endometriosis and a mutation in the NPSR1 gene in macaques. Further, the activity of NPSR1 gene expression was evaluated in mice with endometriosis and it was found that inhibition of NPSR1 gene can reduce inflammation and pain in the abdomen, which are the major symptoms of endometriosis.

Although this target seems to be a potential non-hormonal target but there are many loose ends in this investigation like the full disease spectrum and pathological variations cannot be studied in mice models as they don't menstruate. Also, it is still not proven that this result can be applicable for chronic pain relief. NPSR1 mutations and their functional consequences in macaques should be studied further. Additional research on NPSR1 gene and its variants with respect to their functional effects is required in order to develop a new treatment. If researchers can target the gene in monkeys in the same manner they did in mice, better drug treatment for endometriosis can be developed.



**“In rare cases, endometrium growth spreads outside the abdomen and grow on other organs such as the lungs”**

#### Reference:

Tapmeier, T.T et al., (2021). Neuropeptide S receptor 1 is a nonhormonal treatment target in endometriosis. *Sci. Transl. Med.*, 13(608), pp. eabd6469.



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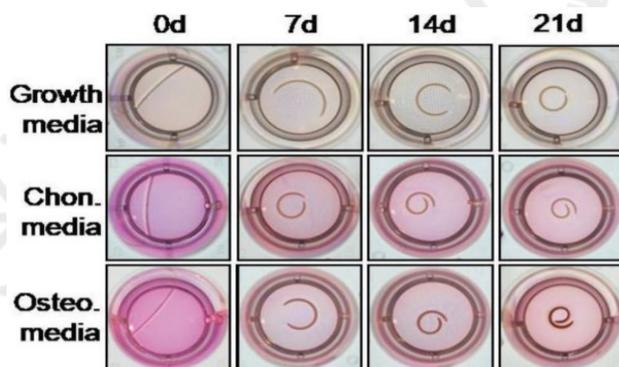
# SHAPE SHIFTING 4D MATERIAL – A NOVEL WINDOW TO TISSUE ENGINEERING

The 4D materials are those that alter geometry in a systematic way over time in response to external stimuli. They hold the promise in replicating the regulated reconfiguration of developing and repairing tissues while also coordinating with their surroundings for better integration due to their dynamic nature.

Many tissues in the human body undergo dynamic shape changes during development and healing process. The 4D materials are useful in tissue engineering procedures because they may induce or partially imitate these geometric changes, making it easier to construct functioning tissues with complex structures.

Tissue engineering approaches have traditionally used polymer structures to create stable structures. The researchers describe a new 4D biomaterial platform that can undergo specific geometric changes over time while also allowing high densities of cells to be incorporated while maintaining viability and performance.

When exposed to water, the ingenious new material will change its shape. It's also suitable with cell-loaded and is biodegradable, making it an ideal candidate for tissue engineering advancement.



**“4D material undergo controlled changes in geometry in response to stimuli which can mimic the geometric changes in tissue healing”**

The hydrogel is made up of properly regulated patterns of two crosslinked polymers (oxidized and methacrylated alginate and methacrylated gelatin), in which changes in the "swelling rates" of the two components cause regulated structural alterations. The researchers also noted that higher the polymer content and crosslinking, lesser and slower the hydrogel absorbs water to alter its shape. By attaching two materials that swell at various rates under cell growth conditions, they were able to accomplish morphological alterations in hydrogel structure.

Alginate and Gelatin were methacrylated in this example to allow photo-crosslinking, and the alginate was oxidized to various degrees to control swelling and biodegradation. The different hydrogels can also be stacked on top of each other like paper, with the variances in their capacity to absorb water causing the hydrogels to bend and twist into "C" shapes. These tubular shapes mimic veins and other tubular organs, setting the stage for the construction of artificial tissue analogues for drug testing. Both polymer hydrogels allow cells to be encapsulated at a concentration with a minimum of 100 million cells/mL and cultured in high-viability growth or differentiating medium. This is the largest cell density yet recorded for 4D materials, and it lasted for a long time, revealing how the



shape-changing, cell-laden hydrogel may be induced to produce bone and cartilage-like tissues. We can control how much bending and how quickly the material bends using these bilayer hydrogels, and because the hydrogels can support high cell densities helps tissues to grow and repair naturally. Therefore, this method has the potential to be utilized for tissue engineering, but it might also be used to investigate the biological processes that take place during early development.

**Reference:**

Lee, Y.B., Jeon, O., Lee, S.J., Ding, A., Wells, D. and Alsberg, E., (2021). Induction of Four-Dimensional Spatiotemporal Geometric Transformations in High Cell Density Tissues via Shape-Changing Hydrogels. *Adv. Funct. Mater.*, p.2010104.



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Oscitation: Scientific term for yawning, so why do we Yawn? What is the necessity? We experience yawning in meeting, in class room, after a heavy meal, even while talking.

Do you know even before a baby is born; it takes tiny yawns in the mother's womb? It's an involuntary action, and has a role in the body's homeostatic mechanism. There are numerous reasons for its occurrence and its contagious effect.

## Pharmacology

Numerous neurotransmitters and hormones have been found which induce yawning. Endogenous chemical mediators such as acetylcholine, dopamine, serotonin, glutamate, nitric oxide, adrenocorticotrophic hormone (ACTH), oxytocin and steroid hormones facilitate yawning, whereas opioid peptides have an inhibitory effect.

Dopamine, oxytocin and glutamate have an effect on the paraventricular nucleus of the hypothalamus and induce yawning via oxytocinergic projection to the Hippocampus, The Pons and the Medulla Oblongata. Other mediators such as serotonin, acetylcholine and ACTH related peptides follow other pathways to induce yawning. Since the complete pathway and exact step involved in it are yet to be studied in a detailed manner. Researchers are trying to correlate the interaction of these pharmacological pathways in various centres in the brain (respiration, communication and empathy).

## Causes

Most widely accepted Hypotheses is "**The Thermoregulation hypothesis**". According to this hypothesis, brain acts as a central processing unit, works best at a certain temperature, so to avoid



overheating, yawning takes place. When a rise in temperature is detected by thermoreceptors, yawning takes place which increases heart rate, blood flow to brain and the inhaled cold air, cools the plethora of the blood vessels in the face and brain. Ultimately solving the issue of overheating. Thus, homeostasis is maintained. There are numerous other hypotheses proposed such as respiratory and circulatory hypotheses, arousal hypothesis, sleepiness hypothesis, ear pressure hypothesis, state change hypothesis etc.

Contagious yawning, as the word itself describes yawning spreads, as we see or hear about yawn, we too yawn simultaneously, currently this topic is studied under physiological conditions and psychological conditions.

In physiological conditions, domino effect shows up, as fixed pattern (one person yawns, it triggers yawn in another person and so on. Nonconscious mimicry, it is similar to the Chameleon effect, when we imitate others even without our own knowledge, if they Yawn, we also tend to. This is due to **\*Mirror Neurons\***. These neurons activate based upon the stimulus received by visual sensation by surrounding. In Psychological conditions (commonly known as empathy yawn) This condition also requires Mirror neurons which





“Mirror neurons – are the one who makes you yawn if you see someone yawn ”

fires when closely related person yawn (example: If a person is known to you and he yawns in front of you, then 75% of chances are there that you also will have yawn) but if unknown person yawn there is only 25% of chances that you yawn.

Myth about Yawning:

**Yawning occurs when Oxygen level in body is dropped down**

It's incorrect since normal exercise also consumes the most amount of oxygen yet people don't yawn frequently or also in the case of hypoxia condition, we don't see patients yawning frequently, thus yawning and breathing rate of oxygen is totally independent of each other.



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Norscia, I., Zanolli, A., Gamba, M. and Palagi, E., 2020. Auditory contagious yawning is highest between friends and family members: support to the emotional bias hypothesis. *Front. Psychol.*, 11, pp.442.

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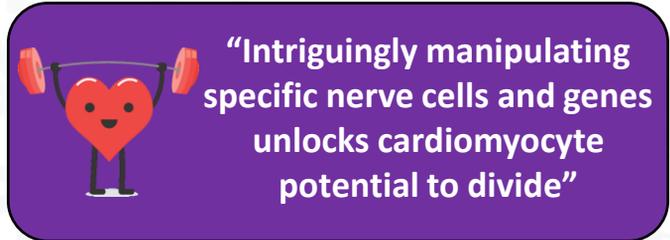


# UNLOCKING REGENERATION POTENTIAL OF CARDIOMYOCYTES

In mammals, heart muscle cells stop multiplying after birth, making any later-life heart injury permanent and leading to heart failure. Unlike other organs such as the liver, the heart cannot heal once it has been harmed. People who survive a cardiac attack can lose up to a billion heart muscle cells and there is scientific evidence that heart heals faster after an attack when the overall number of cells is larger to begin with. Researchers think that by controlling sympathetic nerves and clock genes – a method known as neuromodulation – the heart might be modified to respond to damage considerably better.

Johns Hopkins Medicine researchers report new evidence from mouse experiments that manipulating specific nerve cells or the genes trigger the formation of new heart muscle cells and restore heart function after heart attack and other cardiac disorders. Although nerve cells have long been known to regulate heart function, their role and impact during heart development, as well as their effect on muscle cell growth, have remained unknown. Their study sought to examine the role of sympathetic neurons on heart development after birth. They discovered that, by manipulating neurons, there could be tremendous potential for regulating the total number of muscle cells in the heart even after birth.

Neurons have the ability to control the development, pathogenesis, and regeneration of organs. The sympathetic nervous system is made up of nerve cells that control automatic processes in the body such as digestion, heart rate, and respiration. The researchers created a genetically modified mouse model by blocking sympathetic heart neurons in developing mouse embryos and then examined the drivers of heart muscle cell



proliferation during the first two weeks postnatally. They discovered a considerable drop in the activity of a pair of genes known to drive the circadian cycle, period 1 and period 2. Transcriptomic and protein analyses revealed that these two clock genes were down-regulated, whereas cell cycle genes were up-regulated. Surprisingly, deleting those two circadian genes in mouse embryos resulted in increased neonatal heart size and a 10% rise in the number of cardiomyocytes, or heart muscle cells. This meant that the action of sympathetic nerves on cardiac muscle cells was most likely mediated by these two circadian or "clock" genes. Clock genes are components of the circadian rhythm pattern, which governs body activities in mammals on a more-or-less 24-hour cycle coordinated with daylight and darkness hours.

They also discovered that the two clock genes inhibit myocyte mitosis entrance via the WEE1 kinase pathway. These findings reveal an undiscovered relationship between cardiac neurons and clock genes in the control of cardiomyocyte proliferation and heart growth, as well as mechanistic insights for creating cardiac regeneration neuromodulation techniques.

Dr. Chulan Kwon, Director of Cardiovascular Stem Cell Program at Johns Hopkins University for the first time demonstrated the events when nerves supplied to the heart are cut off, and it gives



fresh insights for designing neuromodulation techniques for cardiac regeneration. Also, researchers focused to describe the groups of neurons that supply the heart and show how those nerves develop and alter over time and after cardiac damage.

According to the Center for Disease Control and Prevention, cardiovascular disease is still the leading cause of mortality, accounting for one out of every four fatalities. So, by having the knowledge about this concept and working on it, may save thousands of lives in future....

#### Reference:

Tampakakis, E., Gangrade, H., Glavaris, S., Htet, M., Murphy, S., Lin, B.L., Liu, T., Saberi, A., Miyamoto, M., Kowalski, W. and Mukoyama, Y.S., (2021). Heart neurons use clock genes to control myocyte proliferation. *Sci. Adv.*, 7(49), p. eabh4181.



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# TOO WELL-KNOWN AND UNAPPRECIATED STRESS, DOUBLE WHAMMY!!!

Chronic stress, sometimes known as the silent or proxy killer, is a key underlying cause of the world's leading causes of death.

According to the Meridian Stress Management Consultancy in the United Kingdom, about 1,80,000 people in the United Kingdom die each year from a stress-related diseases.

According to the Centre for Disease Control and Prevention in the United States, stress accounts for around 75 % of all healthcare visits. This encompasses a wide range of bodily ailments, including but not limited to headaches, back pain, heart difficulties, indigestion, stomach ulcers, sleep issues, exhaustion, and accidents.

According to Occupational Health and Safety News and the National Council on Compensation of Insurance, stress-related problems account for up to 90 % of all visits to primary care physicians.

Stress was recognised by Aristotle, Hippocrates, and other ancients. **Hans Selye**, the Father of Stress Research in 1980s coined the term stress as "nonspecific reaction of the body to any demand". "Stress, like relativity, is a scientific concept that has endured from the double whammy of being both too well known and underappreciated.

## Implications of stress

Despite persistent attempt to analyse the stress-related bases of disease, causal mechanisms to inform specific therapeutic targets remain a mystery. While there is little doubt that there is a correlation between a variety of psychological as well as objective biological indicators of stress with chronic illness, the molecular explanation for how stress leads to end-organ damage over time is unknown.

This is due to a number of barriers based on:

- (1) Unclear definitions of stress
- (2) Unable to accurately assess stress in its natural form
- (3) Failure to distinguish measurements of the stress response due to significant inter and intraindividual variation
- (4) Lack of understanding of the relationship between subjective and objective stress markers

Furthermore, the focus on aggregate data rather than individual data, as well as the categorization of symptoms into strict diagnostic categories, has limited advances in comprehending individual end-organ damage trajectories. Stress and disease have a complicated relationship. Susceptibility to stress differs depends on genetic vulnerability, coping style, personality type, and social support.

Short-term stress has been found to improve the immune system, but chronic stress has a substantial impact on the immune system, which can ultimately result in a disease. It causes an increase in catecholamines and suppressor T cells, which weaken the immune system.

As a result of this suppression, the risk of viral infection increases. Histamine is released in response to stress, which can cause significant bronchoconstriction in asthmatics.





Image courtesy: <https://www.nytimes.com/2019/10/08/well/mind/stress-can-make-you-sick-take-steps-to-reduce-it.html>

Psychological stress changes insulin demand, stress raises the risk of diabetes mellitus, especially in people who are obese.

Peptic ulcers, stress ulcers, and ulcerative colitis are all caused by changes in the acid concentration in the stomach due to stress. Chronic stress, especially when accompanied with a high-fat diet and sedentary lifestyle, can cause atherosclerotic plaque build-up in the arteries. The link between stressful life events and psychiatric illness is stronger than the link between medical or physical illness.

The strongest link between stress and psychiatric disorders is in neuroses, followed by depression and schizophrenia. Recent research has discovered a relationship between stress, tumour development, and the suppression of natural killer cells, which are important in the prevention and destruction of tiny metastases.

The rising cost and frequency of stress-related diseases, particularly in the workplace, is causing increased concern.

"Worked to death, dropped death, work until you drop" are some of the phrases used to describe "job-related death" in the twenty-first century. Countries known for their lengthy working hours are well aware of this; in Japan and China, death by overwork is referred to as karoshi and guolaosi, respectively.

Suicide is recognised as an official and compensable work-related ailment in both Japan and Korea. In the United Kingdom, the estimated prevalence of stress and stress-related disorders increased from 829 instances per 100,000 workers in 1990 to 1,700 cases per 100,000 workers in 2001/2002. Stress, anxiety, and depression were blamed for 13.4 million lost working days in that year, with an estimated



2,65,000 new instances of stress.

According to the most recent Health and Safety Executive analysis of self-reported disease rates, 1.3% of the workforce suffers from stress, despair, or anxiety. According to estimates, 80% to 90% of all workplace accidents are caused by personal issues and employees' inability to cope with stress.

According to the European Agency for Workplace Safety and Health, stress is responsible for nearly half of all workplace absenteeism. With the rise and access towards digital technologies such as wearable devices and mobile phone applications, it is now possible to significantly enhance real-time assessment of the biological stress response.

Simultaneously, advances in artificial intelligence including machine learning might detect diverse, multidimensional information from individual indicators of stress, potentially informing how these indications predict the stress's downstream effects. The combination of these methods has the potential to significantly improve stress research, resulting in more effective and empowering therapies for individuals—bridging knowledge to practices and involvement to real-world application.

**Presently, Dr. Saminathan is Professor and Cluster Dean at Geomatika University College (GUC) Kuala Lumpur, Malaysia where he is indulged academic activities with a Ph.D. in Hospital and Pharmacy Management from Asia e-University, Malaysia in progress. He has been awarded Professorship by the former Prime Minister of Malaysia Tun Dato' Seri Haji Abdullah bin Haji Ahmad Badawi.**

**Dr K. Saminathan has more than 15 years' research experience and 20 publications in reputed journals to his credits. He has actively designed and written the Degree Pharmacology curriculum and obtained Malaysian Qualification Agency(MQA) approval from Ministry of Higher Education of Malaysia, which is a first-degree programme in the speciality in pharmacology and successfully running.**

**He was awarded a patent for his invention on Cardio Protective Effect of *Bryonopsis laciniosa* against Myocardial Infraction and Left Ventricular Proteomic Analysis of Furosemide and Potassium Chloride Treated Rats. He has authored two books and presented 25 scientific paper presentations in national and international conferences.**



**Dr. K. Saminathan**

**Professor and Cluster Dean  
Geomatika University College (GUC)  
Kuala Lumpur**

### About Dr. K. Saminathan

**Professor. Dr. K. Saminathan completed M. Pharmacy in Pharmacy Practice at The Tamil Nadu Dr M.G.R. Medical University, Chennai and MBA from Alagappa University, Karaikudi, India. He pursued Ph.D. in Pharmaceutical Sciences (Pharmacology) from Jawaharlal Nehru Technological University Hyderabad. He also acquired additional Ph. D in Phytochemistry from The Open International University for Complementary Medicines – Sri Lanka. He has served as an Assistant Professor in Smt. Sarojini Ramulamma College of Pharmacy and as a Senior Lecturer in Allianze University College of Medical Sciences (AUCMS) – Malaysia.**



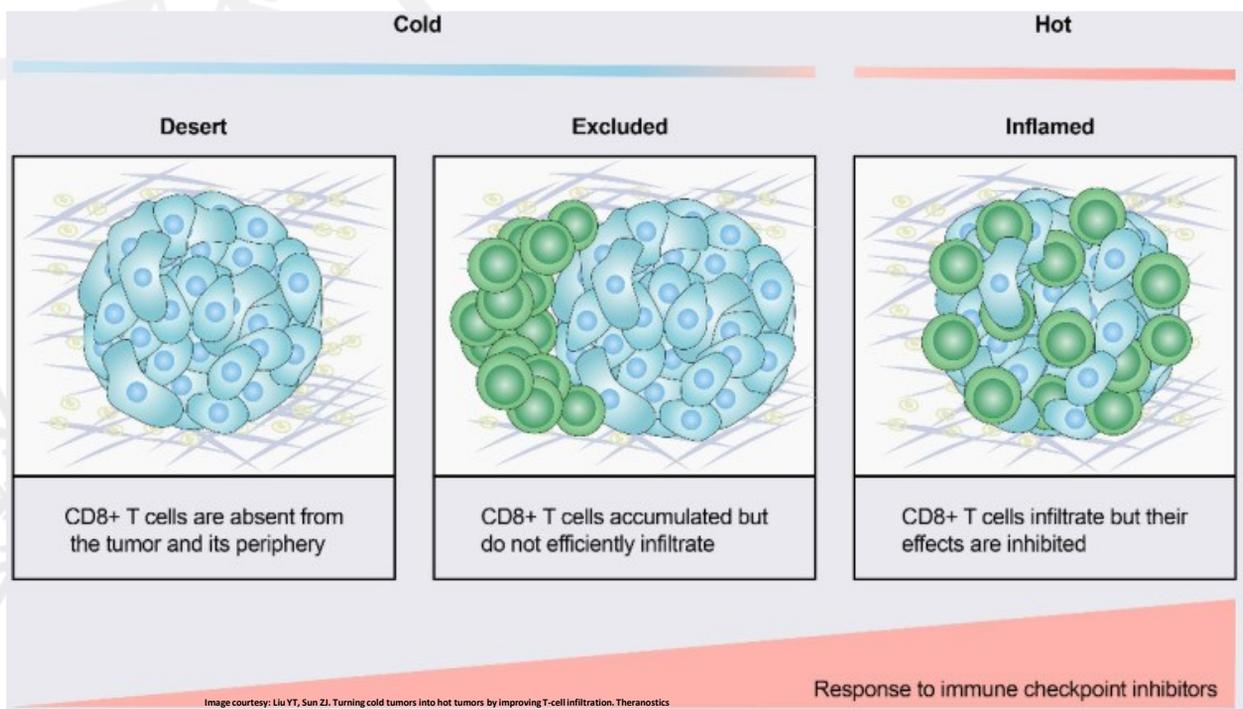
Hot....Cold....!! What exactly are they? Have you ever wondered why certain cancers are referred to as hot tumor and others as cold tumor? Let's take a gander at these Immuno-Oncology terminologies.

## What are hot and cold tumors?

A tumor is classified into one of three fundamental immunophenotypes based on the spatial distribution of cytotoxic immune cells in the TME: immune-inflamed, immune-excluded, or immune-desert phenotypes. High T-cell infiltration, enhanced interferon (IFN) signaling, expression of PD-L1, and a high tumor mutational burden characterize immune-inflamed tumors, often known as "hot tumors". Immune Checkpoint Inhibitors (ICIs) are more effective against tumors having an inflamed phenotype. The basic principle underlying ICIs is to mobilize the T cell response by antibodies.

T cells get exhausted during the tumor attack and cease critical functions that are required to destroy tumor cells. Constant exposure to tumor antigens and signaling through checkpoint receptors causes exhaustion. To forestall this loss of function, the antibodies inhibit signaling through these receptors. Melanoma, non-small cell lung cancer, and carcinoma of bladder, head and neck, kidney, and liver are among the most common types of hot tumor.

"Cold tumors" include immune-excluded tumors and immune-desert tumors. In immune-excluded malignancies, CD8+ T cells locate exclusively at invasion margins and do not efficiently penetrate the tumor while CD8+ T lymphocytes are depleted from the tumor and its periphery in immune-deficient malignancies. Cold tumors have a low mutational burden, low MHC class I expression, and low PD-L1 expression, in addition to inadequate T-cell infiltration.



Cold tumors also contain immunosuppressive cell types such as tumor-associated macrophages (TAMs), T-regulatory cells (Tregs), and myeloid-derived suppressor cells (MDSCs). These characteristics imply that cold tumors lack innate immunity or that the anticancer immune properties present in "cold tumors" are ineffective owing to immune cell exclusion. Cold tumors, unlike hot tumors, seldom respond to ICI monotherapy. Traditional cancer therapies are used to treat most of these tumors. Cold tumors include most malignancies of the breast, ovary, prostate, pancreas, and brain (glioblastoma).

Since cold tumors are resistant to immunotherapy agents, research has been performed recently to see if and how we can "switch" cold tumors to hot tumors. Studies aim to effectively reverse the immunosuppressive microenvironment that surrounds cold tumors, attracting more of the appropriate anti-tumor lymphocytes to combat the cancer. The subject of "How to turn COLD tumors HOT?" is still being pursued by Immuno-Oncology.

#### References:

Liu, Y.T., Sun, Z.J., Turning cold tumors into hot tumors by improving T-cell infiltration. *Theranostics* (2021). 11(11), pp.5365.

Galon J, Bruni D. Approaches to treat immune hot, altered and cold tumours with combination immunotherapies. *Nat Rev Drug Discov* (2018) 18(3), pp.197–218.



**Dr. Beulah Elsa Thomas, Pharm.D, FOP**  
**Clinical Pharmacist**  
**(Dept. of Hematology and Bone Marrow Transplantation)**  
**Sparsh Hospital, Bangalore**

#### About Beulah Elsa Thomas

Beulah has completed her Fellowship in Oncology Pharmacy in 2021 from HCG Cancer Hospital after completing her Doctor of Pharmacy from M. S. Ramaiah College of Pharmacy in 2017.

Currently, she's working as Hemato-Oncology Clinical Pharmacist and Bone Marrow Transplantation Co-ordinator at Sparsh Hospital, Bangalore. Her major research areas are in domains of Immuno-oncology, Biomarker validations and Targeted agents in Ovarian cancer



## FATHER OF INDIAN PHARMACOLOGY



Sir Ram Nath Chopra was a leader of Indian Science and Medicine and he is known as the "**Father of Indian Pharmacology**" because of his contribution in pharmaceuticals and quest for India's drug self-sufficiency through the experimental evaluation of indigenous as well as traditional drugs.

Prof R. N. Chopra was born in Gujranwala, Punjab, on August 17, 1882. He has completed his primary and secondary education in Jammu & Srinagar, and degree at Government College in Lahore. In 1903, he moved to England and enrolled at Downing College, Cambridge. He qualified for the Natural Sciences Tripos and was admitted to the B.A. programme in 1905.

Prof R. N. Chopra the honour of working with Dr. Walter E. Dixon, a renowned experimental pharmacologist. He was a successful candidate for the Indian Medical Service (1908). He went to Bartholomew's hospital to pursue his M.B.B.S and M.D. from Cambridge, as well as his M.R.C.P. from London. He was the first professor at the newly established Calcutta School of Tropical Medicine in 1921.

Shortly, his pharmacology laboratory surpassed the capabilities of some of the best pharmacological laboratories in the United Kingdom and many young researchers and trainees from various provinces was worked under him.

He gave the subject a new face, transforming it from traditional *Materia Medica* to modern pharmacology with his expertise in experimental pharmacology. Prof R. N. Chopra conducted a variety of studies in the field of pharmacology and drug analysis. He was the first in India to establish a pharmacology study and research centre at the Calcutta School of Tropical Medicine.

The Department of Pharmacology is well-known for its research in tropical medicine, therapeutics, chemotherapy, experimental pharmacology, toxicology, clinical drug evaluation, drug addiction, indigenous drugs, drug standardisation and biological assays and diagnostic services.

Prof R. N. Chopra remained at the Calcutta School of Tropical Medicine for two decades (1921-41), including seven years as Director. Following his



“In the honour of his contributions Government of India released a postal stamp on his 101<sup>st</sup> Birthday”



retirement from the Calcutta School, he returned to his home state of Jammu and Kashmir, where he was appointed as Director of Medical Services and Drug Research Laboratory.

The books "Indigenous Drugs of India," "Glossary of Medicinal Plants of India," and "Poisonous Plants of India" by Prof R. N. Chopra and colleagues became the most enduring and popular encyclopedia of Indian medicinal plants. He had an impact on the development of pharmaceutical industry and education.

Prof R. N. Chopra's abilities, contributions, and standing were duly acknowledged by numerous prestigious awards like award of C.I.E., Minto Medal, Mouatt Medal, Coatos Medal and also the Doctor of science degree was awarded from Cambridge University for his significant contributions.

Prof R. N. Chopra was elected to the American Society for Pharmacology and Experimental Therapeutics, The Pharmaceutical Society of Great Britain, The Belgian Society of Tropical Medicine as an honorary member, General President of the Indian Science Congress, and as honorary member of the Indian Pharmaceutical Association. On his 101<sup>st</sup> the Government of India issued a postal

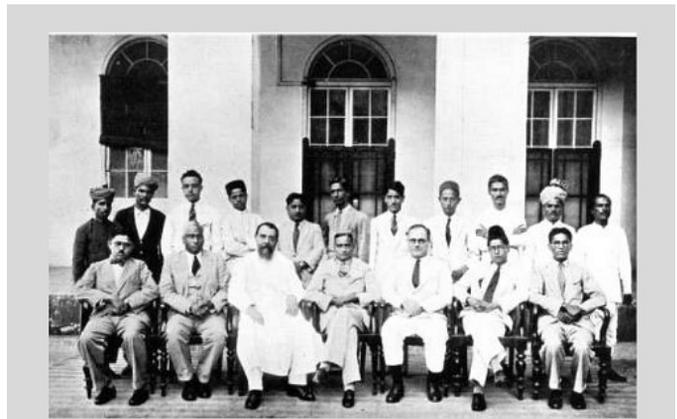


Image courtesy: <https://swarajyamag.com/science/the-scent-of-a-flower-the-forgotten-genius-of-colonel-chopra-part-ii>

### The Drugs Enquiry Committee

Sitting from left to right: Dr B Mukherjee (Assistant Secretary), C Govindan Nayar (Secretary), Father J F Caius, **Lt Col R N Chopra (Chairman)**, H Cooper, Abdul Matin Chaudhury

stamp with a denomination of fifty paise. Prof R. N. Chopra died on June 13, 1973, in his home in Srinagar, Kashmir. He elevated himself almost to the status of a "Institution rather than an individual," a glorious career rarely attained by most Indian medical scientists.

Prof R. N. Chopra was also known for his modesty, courtesy, and kindness. He is remembered for his magnetic and simple personality, idealism, boundless enthusiasm, unwavering dedication to laboratory and clinical work, and, above all, his remarkable ability to foster a "team spirit."

### Reference:

Singh, H., (2009). Sir Ram Nath Chopra: a profile. *Journal of Young Pharmacists*, 1(3), p.192.

# NEVER STOP LEARNING



## WEBINARS

Watch Us On  
**YouTube**

Department of Pharmacology, FPH, RUAS believes in supporting students and pharma fraternity with knowledge and information apart from regular curriculum

**ALTERNATIVES TO ANIMAL EXPERIMENTATION - 5R CONCEPT**  
By Dr. S. Kavimani



**DRUG DISCOVERY IN MULTI-OMICS ERA**  
By Dr. Jaikanth C



**RESEARCH METHODS IN PHARMACOVIGILANCE**  
By Dr. Sri Harsha Chalsani



**FEVER: TO TREAT OR NOT TO TREAT?**  
By Dr. M. K. UNnikrishnan





## UPCOMING EVENTS

An opportunity to take pledge as a eye & organ donor



State NSS Cell  
Government of Karnataka

Department of Pharmacology in Association  
with NSS RUAS presents



**MOHAN**  
FOUNDATION

### KASI – A SENSITIZATION SESSION ON ORGAN DONATION

#### Session Highlights

- ❖ National and International Statistics on Organ Donation
- ❖ Why, When, How and What of Organ and Tissue Donation
- ❖ Brain Death : An explanation
- ❖ Myths in Organ Donation
- ❖ Laws Governing Organ Transplantation
- ❖ National and State Protocols : Regulatory Guidelines
- ❖ Leaving a Legacy
- ❖ Case study



Speaker

**Dr. Hemal Kanvinde**

Quality Assurance Officer  
MOHAN Foundation

09/January/2022

03:00 PM – 04:00 PM IST

Event Registration Link

[Microsoft Teams](#)

Department of Pharmacology in Association  
with VisionMate Foundation presents



**VISIONMATE**<sup>TM</sup>  
FOUNDATION

### AKSHI – CURRENT SCENARIO OF CORNEAL BLINDNESS IN INDIA – MYTH AND FACTS

#### Session Highlights

- ❖ National Statistics on Eye Donation
- ❖ Why, When, How and What of Eye Donation
- ❖ Myths in Eye Donation
- ❖ National and State Protocols: Regulatory Guidelines



Speaker

**Mr. Ganesh**

Trustee  
VisionMate Foundation

 22/January/2022

 11:00 AM – 12:00 PM IST

Event Registration Link

[Microsoft Teams](#)



E-Certificate will be provided for participants

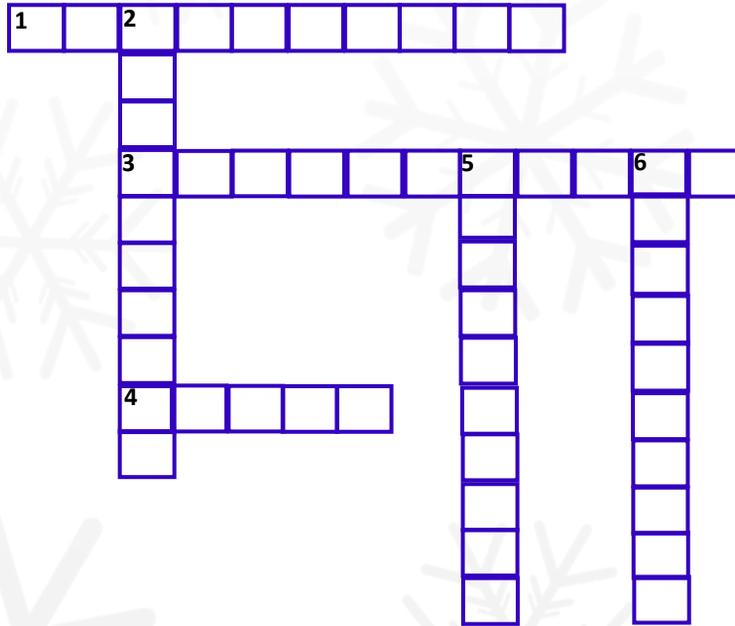




# Mind Lab



## Solve the Crossword



### Across

1. I'm an extract from calf lungs, use me in respiratory distress syndrome in premature infants
3. First Marketed Cephalosporin
4. Country known as pharmacy of the world

### Down

2. I can combat for methotrexate toxicity
5. Drug used for allergic conjunctivitis & hay fever
6. Antidepressant drug used for the treatment of bed wetting

#### Terms and conditions

- Mind lab – III consists of **Two** segments, Solved answers to be mailed to [fphpanpharmacon@gmail.com](mailto:fphpanpharmacon@gmail.com) on or before **15-February-2022**
- It is mandatory to answer both segments to be eligible for availing the prize
- **One** Winner will be selected by lot system & Editorial board – Panpharmacon reserves all the rights
- Winner details will be announced in the upcoming issue
- Participation is restricted for Indian nationals only





## Find the word

T A B V Y U A B A P N A M  
B P Z P B P M C C E D C I  
N A R I S I T A P A V A O  
P R C N C N P B I T E Z T  
S E I I E M C V V M O Z A  
A C L M M H L E I O H E R  
Z O O B B O A P N V S P G  
V E M E L B D O M I I E V  
E S E O I I S Z S R V T Y  
R I C T X E E Z I A O P V  
G A S T S O M I C R O N S  
K I A C A B H T A C N O R  
R R T A Z O O N P M H R N

**Omicron, Vyvgart, Patisiran, Zoonoses, Scemblix**



### Winner – Mind Lab III

**Mr. Vikas**

**III B.Pharm**

**Faculty of Pharmacy,  
Ramaiah University of Applied Sciences**





## ACHIEVEMENTS & RECENT RESEARCH PUBLICATIONS

### AWARDS

- ❖ Award of Indian Patent to Prof. R. Deveswaran and **Prof. J. Anbu** - Faculty of Pharmacy to the Invention entitled - **“An In-situ Gel For Corneal Wound”** Patent Grant No. **377903**
- ❖ **Ms. Sathiya R** received “Annual Exemplary Faculty Award” for the year 2021 during the Teacher’s Day Celebration held at RUAS on 06<sup>th</sup> September 2021
- ❖ **Mr. Damodar Nayak A** received “Annual Exemplary Faculty Award” for the year 2021 during the Teacher’s Day Celebration held at RUAS on 06<sup>th</sup> September 2021

### PUBLICATIONS

- ❖ **Nair, G.**, Hema Sree, G. N. S., Saraswathy, G. R., Marise, V. L. P. & Krishna Murthy, T. P.(2021). Application of comprehensive bioinformatics approaches to reconnoiter crucial genes and pathways underpinning hepatocellular carcinoma: A drug repurposing endeavor, *Medical Oncology*, 38, pp. 145.
- ❖ **Haroon, H. B.**, Mukherjee, D., Anbu, J. & Teja, B. V.(2021). Thiolated chitosan-centella asiatica nanocomposite: A potential brain targeting strategy through nasal route, *AAPS PharmSciTech*, 22, pp. 251
- ❖ **Mohammad Azamthulla**, Devadath NG, Ashoka Babu VL, Basavaraj BV Stomach Specific Low Density Floating Microballoons For Extended Delivery Of Rhynchosia Densiflora Extract In The Treatment Of Peptic Ulcer. *Trends in Pharmaceutical Sciences*. (Accepted Manuscript (TIPS-ID 2110-1124 (R1))





# STUDENT CONCILIUM



Dr. Manisha Devi



Ms. Goutami R B



Ms. Evangelene K



Ms. Swathi D S



Ms. Divya Sree D



Ms. Susan Ealias  
Attasseril



Mr. Chethan S



Ms. Anjani Singh



Mr. Kirthi Bhushan A



Mr. Abhilash S



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Ms. Khushboo Kumari



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Mr. Shannon D Almeida



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The Ramaiah Group, through our Trusts, Gokula Education Foundation (set up in 1963) and Gokula Education Foundation – Medical (set up in 1979), focus on

# Healthcare & Education

we seek to move our society towards greater harmony and inclusiveness



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and, It begins with the teacher !!  
The launchpad for your sound career !!!

ज्ञानं विज्ञानं च भक्तिसहितं  
*jnanam vijnanam cha bhaktisहितam*  
devotion to enlightenment

**Gokula Education Foundation** is proud to present the performance and ranking of its Institutions under **NIRF**(National Institutional Ranking Frame Work)

Ministry of Education, Government of India

## Rankings for the year 2021

Gokula Education Foundation (Engineering & General Sciences)

Gokula Education Foundation (Medical)

**Ramaiah Institute of Technology**

**Ramaiah College of Arts, Science and Commerce**

**Ramaiah Medical College**

**Ramaiah University of Applied Sciences**

**65<sup>th</sup>**  
Rank

**62<sup>nd</sup>**  
Rank

**37<sup>th</sup>**  
Rank

**52<sup>nd</sup>**  
Rank

**15<sup>th</sup>**  
Rank

Among 1143 Engineering Institutions of India  
First among VTU affiliated institutions in Karnataka

Among 1802 Colleges of India  
First in Karnataka\*

Among 111 medical colleges of India

Among 351 Pharmacy colleges of India

Among 117 Dental Colleges of India

Source: NIRF 2021 Rankings **nirf**

Source: NIRF 2021 Rankings **nirf**

## Ramaiah Group of Institutions

29 Institutions integrated in a vast sprawling campus in the heart of Bengaluru, the Silicon City of India to deliver knowledge across all aspects of human endeavour - **Engineering, Medicine, Healthcare, General Sciences, Commerce, Law, Management and Social Sciences**

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