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Panpharmacon

A Quarterly E-Newsletter

Department of Pharmacology

Faculty of Pharmacy

Ramaiah University of Applied Sciences
New BEL Road, M S R Nagar, Gnanagangothri Campus
Bengaluru, Karnataka 560054

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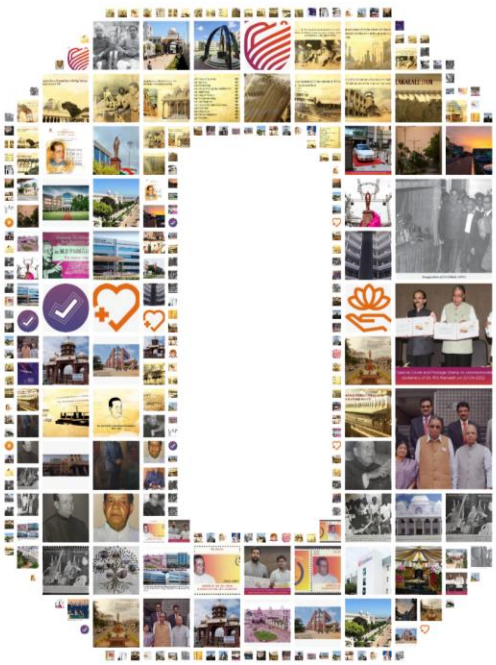
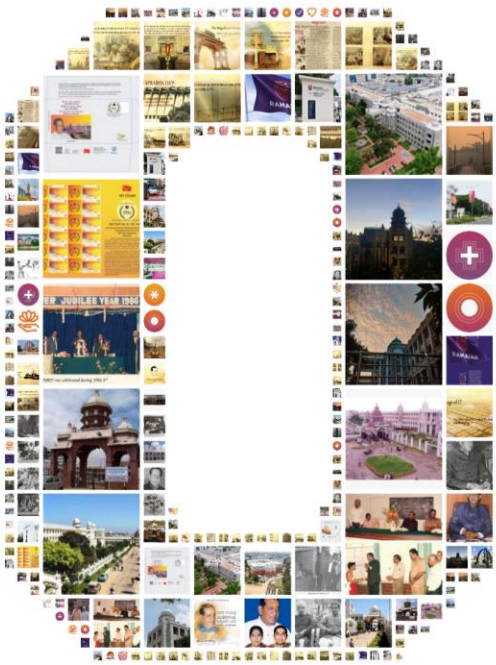
Celebrating





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Ramaiah Group of Institutions has over 61 years of legacy of nurturing talents in the field of education and healthcare. Ramaiah University of Applied Sciences (RUAS) established in 2013, is an offshoot of this great premise, which has a stronghold of over 5000 small and medium enterprise's built a legacy of a group of institutions that focuses on student-centric higher education and preparing them to meet future challenges through experiential learning with industry 4.0 infrastructure and one is gearing the implementation of NEP 2020. The technology campus is housed amidst the industrial hub at Peenya, Bengaluru.

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RAMAIAH UNIVERSITY OF APPLIED SCIENCES | Faculty of Pharmacy

Faculty of Pharmacy

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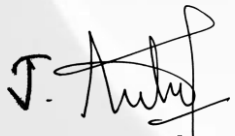
Editor's Note

Hello Readers !!!

It is a great pleasure for me to share the last issue of year 2022 of Panpharmacon. I am looking forward to expand the scope of our newsletter by including more interesting news, employment opportunities and conference announcements. I am pleased to welcome Mrs. Akshata N, as our new associate editor. In this issue, we have highlighted the participation of Panpharmacon Student Club in various events. Including the successful launch of Samarthya - GPAT Mock Exam series for the aspirants. Hope this initiation will support the GPAT aspirants to prepare efficiently. I would like to congratulate the winners of Mind Lab of previous edition & personally thank Dr. Mansi Mehta and Ms. Divyasree Davuluri for their contribution in this issue. I also convey my profound thanks to all other contributors for having put their thoughts and experiences into an engaging read. We would love to hear from you 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, Pro-Vice Chancellors for their patronage and advising us on the importance of enhancing the visibility of workplace that stimulated us to come out with Panpharmacon, an E – Newsletter. We also thank all our colleagues, well wishers, student concilium and friends for supporting us in making this newsletter.

CONTENTS

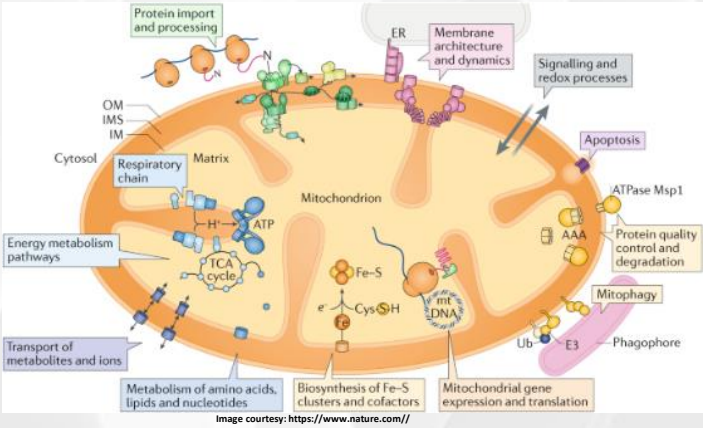
MOTHER'S MITOCHONDRIAL INFUSION BOON TO RARE DISEASES IN KIDS

Children with defective mitochondria may be able to receive a gift from their mother's that will re-energize their cells. A research team reinfused the blood cells of patients after soaking them in a broth containing healthy mitochondria from their mothers. Early results indicates that the technique is secure, may benefit the kids' growth and health. Further clinical trials on this concept are in progress.

The majority of adenosine triphosphate, that energise the cells are produced by mitochondria, which was first discovered in symbiotic bacteria within other creatures. However, one in 5000 neonates will have mitochondrial abnormalities, which can result in fatal diseases.

Elad Jacoby *et al.,* at Sheba Medical Center, investigated that when isolated mitochondria are combined with cells, organelles enter the cells and begin to function. It was hypothesised that they would be able to take advantage of this tendency to increase the proportion of healthy mitochondria in patients' cells. The investigators focused on hematopoietic stem and progenitor cells (HSPCs), which are bone marrow derived stem cells that can differentiate into different types of blood cells. HSPCs are distributed throughout the body. It may reduce the consequences of disease in other tissues.

The researchers observed at few kids with Pearson syndrome or Kearns-Sayre syndrome, which is caused by deletion of mitochondrial DNA, under compassionate use. This is a legal pathway for testing novel treatments on patients with incurable diseases. The children's cells were working inefficiently, which led to issues like kidney illness, diabetes, irregular heartbeats, and frailty. Their mitochondrial DNA was found to be shorter than 97% of their counterparts due to impaired growth.



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Healthy mitochondria were taken from the mother's blood and combined with HSPCs from the patients, and they were reinfused into the patients' bloodstreams after 24hours of incubation. The cells' mitochondrial activity suggested that at least some of the organelles had been taken up by the cells. One year after the reinfusion, the patients' blood cells had 30% more mitochondrial DNA and generated 33% more ATP than previous recordings.

After reinfusion the kids were found to put on weight, and the patients assessed for their strength and endurance showed improvement. According to the team all of them are still alive, including one child who received treatment nearly five years ago.

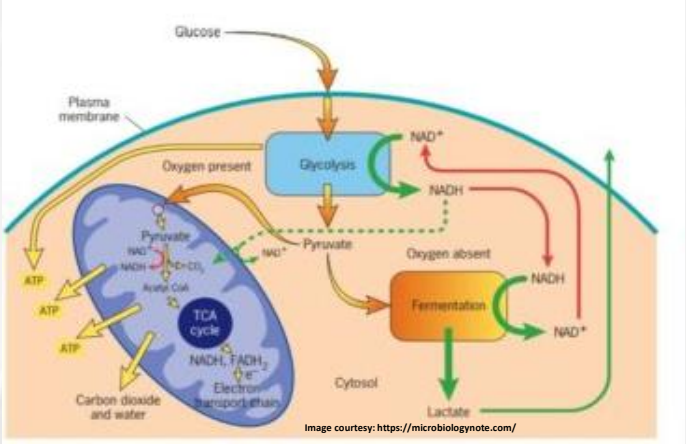

Image courtesy: https://microbiologynote.com/

The healthy mitochondria would slip into the stem cells, which could then be inserted back into the patient's bloodstream. This might increase the number of healthy mitochondria in the patient and, hopefully, help treat their disorders.

Since, the study lacked a control group for comparison, researchers were unable to know how the diseases' symptoms generally change as kids grew older. The results of a clinical experiment including the treatment on few more patients who had the two syndromes are currently being analysed by the researchers, and they intend to begin a new trial to see if the reinfused cells settle down and survive.

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NASAL-SPRAY VACCINES FOR COVID-19: A NOVEL APPROACH

Globally, about 100 mucosal COVID-19 vaccines are being developed, according to Airfinity, a London-based health analytics firm. There is a hope for numerous research in the business organisations towards developing novel vaccine, involving the use of sprays or drops administered through nasal/oral route that aim to improve protection against the virus SARS-CoV-2.

About 20 of COVID-19 mucosal vaccines have advanced to human clinical trials, and at least four of them in India and two in China have finished or undertaking phase III studies to evaluate their safety and effectiveness in comparison to other vaccines.

Any vaccination must meet the high standard of preventing infection and spreading. However, research on SARS-CoV-2 mucosal vaccinations in animals raises the possibility. For instance, Goldman-Israelow *et. al.,* at Yale University discovered, an intramuscular booster did not induce mucosal immunity in mice whereas, an intranasal booster (given after one dose of the conventional vaccine) completely protected them from a lethal level of exposure to the corona virus.

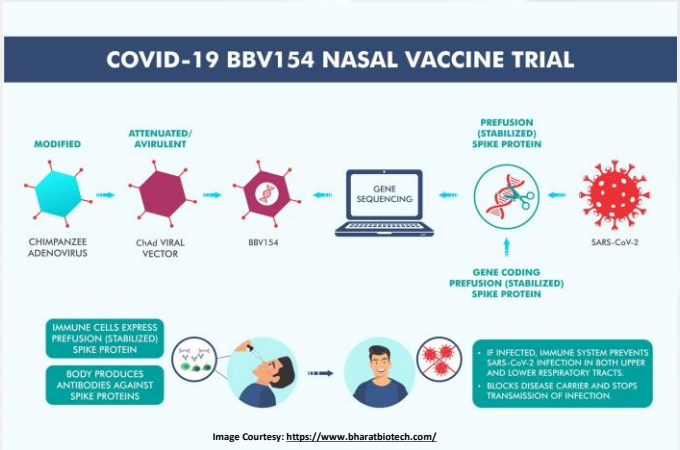

Image Courtesy: https://www.bharatbiotech.com/

Another intranasal vaccination that is used as an influenza-like virus to deliver SARS-CoV-2 RNA to cells completely protected rhesus macaques

Govt. of India has approved the intranasal Covid-19 vaccine for citizens above 18 years of age. The task of nasal vaccination is to generate an immune response directly in the mucosa. This nasal vaccine has proved to be very effective in clinical trials.

(Macacamulatta) from SARS-CoV-2 infection. According to Ursula Buchholz, at the National Institute of Allergy and Infectious Diseases, who supervised the study, there was no evidence of virus replication in the monkeys' airways or lung tissues.

However, there is no conclusive correlation with mucosal vaccinations that attempt to induce immunity. Researchers across the globe are analysing immunological responses in the respiratory tract, including tissue-resident memory T cells, secretory IgA, and other antibodies. These will definitely help to protect, but it is not apparent at what dosages the infection and transmission can be stopped. Studies of immunological responses in individuals who have natural infection in their nose and lungs may be instructive.

The potency of mucosal vaccines in pipeline are being evaluated through basic research. In a study conducted by Bharat Biotech, India, intranasal COVID-19 vaccine was assessed for the presence of systemic neutralizing antibodies in blood serum. This trial is expected to be successful, if this vaccine surpass the antibody levels produced by the commercially available intramuscular vaccines.

The efficacy test for mucosal vaccine should be carried out with placebo group. Similar kind of

clinical trials are envisaged by Codagenix, New York, and in the Serum Institute of India. According to Robert Coleman, CEO of Codagenix, the effectiveness of the vaccine will be assessed by comparing the number of confirmed cases in each group and calculating the rate of protection.

As the population of those who have not received the SARS-CoV-2 vaccine or been infected decreases, it becomes more difficult to form placebo groups. Considering that there are many affordable and effective vaccine trials are critical to justify ethically.

However, such research can be legitimately carried out in some countries with low immunization rates and restricted access to vaccines. Sandy Douglas, primary investigator of an intranasal SARS-CoV-2 vaccine being developed, claims that "It is entirely doable to evaluate efficacy".

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CANNABIS –THE KNOWNS AND UNKNOWNS

The use of marijuana is often associated with a higher risk of anxiety and sadness. It is also connected to psychoses, schizophrenia-related ones, especially in hereditary aspects.

Marijuana affects one's ability to drive both immediately and over time; it is the illegal substance most often associated with accidents and impaired driving, including fatal ones. Additionally, marijuana usage has been linked to vascular issues that raise the risk of myocardial infarction, stroke, and transient ischemic episodes when high.

Patients may be more inclined to ask doctors about marijuana's potential bad and good effects on health due to the rapid changes in environment around marijuana's legalisation for medicinal and recreational use. Inhalation is the most typical method of administration. There is now acknowledgement of a legitimate cannabis withdrawal syndrome, which makes hard to quit and increases the likelihood of recurrence. This syndrome's symptoms include irritability, difficulty in sleeping, dysphoria, desire, and anxiety.

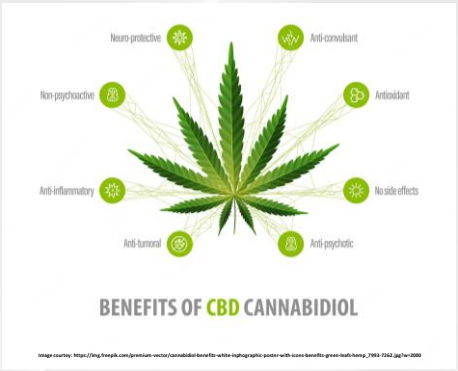
Early and frequent use of marijuana indicates a higher chance of developing a marijuana addiction. Due to the active and rapid development of the endocannabinoid system, adolescents are more susceptible to negative long-term effects of marijuana.

The dopamine neurons that control the reward centres of the brain exhibit less response in animals exposed to cannabis throughout adolescence. Prenatal cannabis exposure in rats changes the developmental control of the mesolimbic dopamine pathway in the afflicted offspring.

Despite the fact that these results are in favour of the notion that marijuana is a gateway drug, other substances that prepare the brain for a stronger reaction to other substances, including alcohol and nicotine, can also be classified in the same manner.

The consumption of marijuana increases the risk of respiratory diseases. These associations are consistent with the fact that regular marijuana users are more likely than non-users to report having chronic bronchitis. On the other hand, marijuana has its own potential benefits like promoting appetite, particularly in cancer patients, those with AIDS and for glaucoma treatment by reducing intraocular pressure.

OCULAR	SYSTEMIC
Conjunctival hyperemia	**Tachycardia**
Decreased lacrimation	**↓blood pressure**
Photophobia	**Orthostatic hypotension**
Ptosis	**Euphoria or dysphoria**
Blepharospasm	**Impaired coordination**
Nystagmus	**Difficulty with concentration Impairment of accommodation problem solving, memory**
Impaired Accommodation	**Decreased testosterone**
	Impaired immunity
*** Any route of administration**	



Marijuana use among all adult age groups, both sexes, and pregnant women is going up. At the same time, the perception of how harmful marijuana use can be is declining. Increasingly, young people today do not consider marijuana use a risky behaviour.

Increased use of marijuana has been linked to a number of negative consequences, related to CVS, CNS and respiratory system. Like other addictive substances, marijuana may cause addiction. Marijuana use when intoxicated can impair cognitive (such as memory and time perception) and motor performance, and these effects can have negative impacts. On persistent consumption of marijuana at teenage will alter the brain chemistry irreversibly.

In this regard, legal drugs (alcohol and cigarettes) present a sobering perspective; they are responsible for the majority of diseases related to drug use, not because they are more hazardous than illegal substances. It is logical and perhaps prudent to assume that as legislation moves toward legalising marijuana, its usage will rise and that, by implication, so will the number of people who will experience unfavourable health effects.

Several compounds identified in cannabis have potential remedial benefit either alone or in combination with other unexplored compounds. Based on the various research, it is evident that cannabis could alter the haemostasis and the uncertainty related to treatment efficacy need to be validated.

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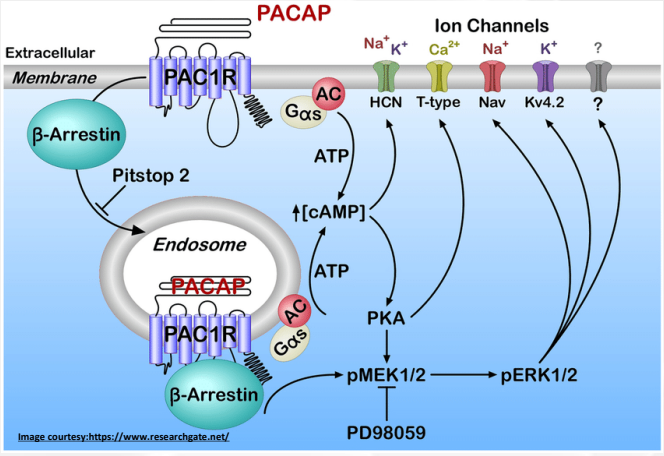
PAC-1 - A PROMISING ANTI-CANCER AGENT

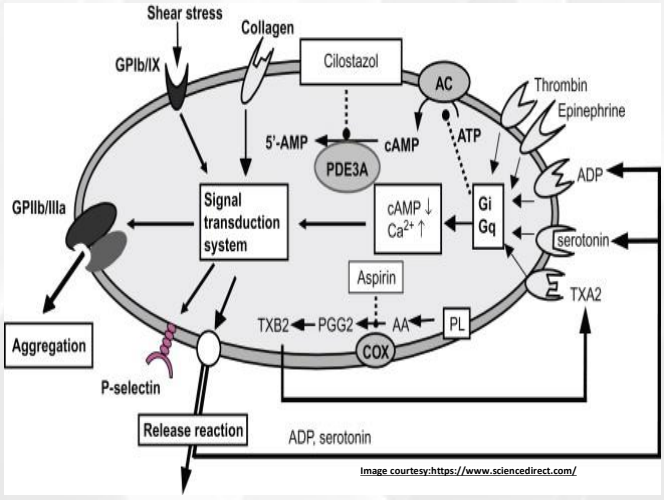
The scientists from University of Illinois recognised Procaspase Activating Compound - 1(PAC-1) as the anti-cancer agent that activates the pathway responsible for inhibition of cancer cell proliferation. Procaspase-3, a protein present in most cells, is converted into active caspase-3, an enzyme that triggers apoptosis. Paul Hergenrother *et. al.,* at the University of Iowa also discovered that procaspase-3 is more prevalent in cancer cells than in healthy tissues. This feature made it a suitable target for anti-cancer medicines, combined with its propensity to be activated in cancer cells.

Hergenrother and Dr. Timothy Fan, at the University of Illinois, discovered that an early formulation of PAC-1 exhibited anti-cancer properties in dogs with spontaneously developing lymphomas, meningiomas, and osteosarcomas.

The clinical studies for humans were started some years ago by a private investor, which laid foundation for the initiative of Hergenrother.



More findings from a phase I clinical study of PAC-1 in patients with glioblastoma multiforme, an aggressive kind of brain cancer for which there is only one medicine approved for treatment, are anticipated soon.



The researchers used PAC-1 together with the medication temozolomide in the most recent clinical study. In earlier study, the scientists found that PAC-1 passes the blood-brain barrier, which is crucial for any therapy of brain cancer.

To advance the therapy into phase II clinical trials, much healthier individuals with very similar disease characteristics are utilized by the doctors. Additionally, encouraging outcomes were seen when PAC-1 was used with radiotherapy, temozolomide on pet dogs with brain tumours. It will be less expensive to test PAC-1 against additional malignancies, and it is clinically proved as effective therapeutic agent against multiple cancer types and the medicine will be approved for use in those populations.

Results of a clinical trial conducted by Dr. Arkadiusz Dudek, at Regions Hospital in St. Paul, Minnesota, and at Mayo Clinic in Rochester, Minnesota, were found to be noteworthy in number of patients with advanced disease.

Patients and doctors from three institutions are involved in the clinical study, including those from Regions Hospital, the University of Illinois at Chicago, and Johns Hopkins University.

PAC-1 is a potential anti-cancer compound could switch on a pathway that is suppressed in cancer cells. The first step of this pathway involves the conversion of procaspase-3, a protein found in most cells, into caspase-3, an enzyme that, when activated, initiates programmed cell death.

Further, phase I clinical studies are intended to determine whether a novel medicinal molecule has dangerous toxicities or side effects in human patients. However, researchers might also seek for early indications of treatment advantages. Cancer patients with advanced illness who had exhausted all other therapy options were enrolled in the experiment.

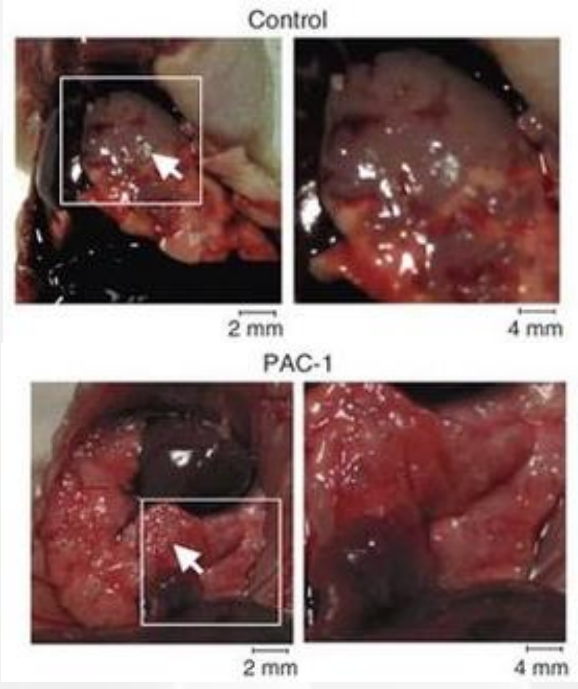


Image Courtesy: Karson et.al., PAC-1 significantly retards tumour growth

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ROLE OF PROBIOTIC MICROFLORA IN GUT FOR GALVANIZING PHYSICAL ACTIVITIES

Exercise has numerous positive effects on healthy physiology. However, the factors controlling a person's drive to exercise, nevertheless, are still not fully comprehended. The motivational pleasure experienced after engaging in sustained physical activity, produced by exercise-induced neuro-chemical changes in the brain, is a key component promoting both competitive and recreational exercise. It is reported that boosting dopamine signalling during physical activity improves exercise performance in mice. According to a research, the creation of endocannabinoid metabolites by the microbiota in the gut increases the activity of sensory neurons that express Transient receptor potential vanilloid subtype 1 which raises dopamine levels in the ventral striatum during exercise.

Athletic's performance is enhanced when this system is stimulated, whereas exercise capacity is reduced by microbiota depletion, peripheral endocannabinoid receptor inhibition, spinal afferent neuron ablation, or dopamine blockade. These findings provide a microbiome-dependent explanation for interindividual variability in exercise performance and show that the rewarding qualities of exercise are modulated by gut-derived interoceptive circuits. Research also indicates that interoceptomimetic chemicals that promote the brain's reception of gut-derived signals may increase exercise motivation.

Microbiologist Christoph from University of Pennsylvania experimented in mice, which were designed to have a lot of genetic and behavioural variety, to better understand why some people enjoy exercise while others don't. His team discovered a disparity in the distance travelled by the mice while running on wheels in their cages where some travelled more than 30 kilometres in 48 hours, while others hardly moved.

The genetics and biochemistry of the active and inactive mice didn't change much from one another. However, the researchers suggested that mice were typically quite energetic tended to exercise less when administered with antibiotics. Studies conducted in the wake of the initial ones revealed that the antibiotic therapy had an impact on the mice brain. The levels of dopamine, the neurotransmitter associated with the "runner's high" declined, along with the activity of specific

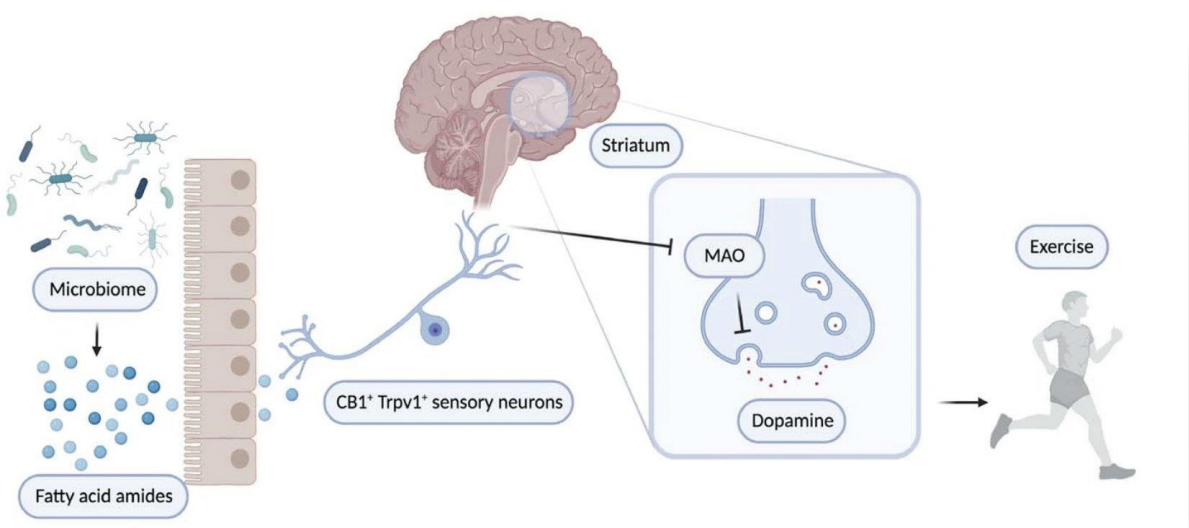

Image courtesy: Dohnalová, L., Lundgren, P., Carty, J.R., Goldstein, N., Wenski, S.L., Nanudorn, P., Thiengmag, S., Huang, K.P., Litichevskiy, L., Descamps, H.C. and Chellappa, K., 2022. A microbiome-dependent gut–brain pathway regulates motivation for exercise. *Nature*, pp.1-9.

A new gut bacterium with the genes that produce fatty acid amides was administered in mice and an increase in dopamine was observed. According to studies, individuals who run marathons have higher numbers of specific gut bacteria, which may be related to exercise.

genes in the brain. The team discovered the dopamine-enhancing signal travels through neurons in the spine to the brain after investigating mice that were genetically altered to lack specific nerve cells and chemically inhibiting the function of nerves that transmit messages from the gut to the brain. The scientists were able to deliver the pro-exercise instruction even to animals without gut microbes by stimulating those nerves.

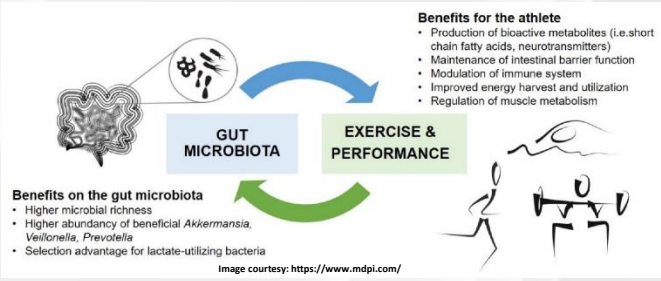

Image courtesy: https://www.mdpi.com/

These spinal neurons were removed from the body and exposed in the laboratory to different types of gut bacteria as well as microorganisms. Dopamine levels spiked in the animals' brain during exercise when they were administered with these chemicals, called fatty acid amides. A new gut bacterium with the genes that produce fatty acid amides was administered in microorganisms eradicated mice by antibiotics.

According to a research report, individuals who run marathon have higher numbers of specific gut bacteria, which may be related to exercise. Additionally, a great deal of research has shown how important dopamine is in driving behaviour. The reward system is such a crucial element of physiology that is something virtually true in other animals including humans.

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Shannon Almeida
M.Pharm
Department of Pharmacology

ATG8 LIPIDATION TO COMBAT STRESS AND BEYOND

The term "autophagy" was used in 1963 to characterize intracellular vacuoles harbouring proteolytic enzymes connected with fragments of sequestered cytoplasm in breakdown visible by electron microscopy. Classical autophagy is now defined as the bundling of intracellular materials inside an enlarged membrane bud that folds over itself, forming a double-membrane chamber destined for integration with lysosomes.

The genetic models were used to identify the essential genes associated in the autophagy pathway and this paved a way for far-reaching implications on how homeostasis and cell defence are controlled in health and illness.

It is a crucial step in rebuilding cell health in stressful situations and thus has important roles in metabolic syndromes, cancer, neurodegenerative disorders, and immune response to contagious diseases. As bulk autophagy encourages the removal of intracellular shrapnel and the removal of intracellular intruders, activated by nutritional stress or cell injury to target and remove protein structures of various organelles (selective autophagy). Throughout evolution, the same machinery has been chosen to separate and eliminate pathogens that penetrate the cytosol of host cells (xenophagy).

The elements of autophagy mechanism can be involved in alternate molecular complexes that direct Autophagy-related protein8(ATG8) lipidation to different cell divisions, with repercussions that go beyond cargo breakdown. The conjugation of ATG8 to single membranes (CASM), a mechanism known to take place in divisions of the endocytosis formed during the engulfment of specific cargo, is one instance of noncanonical autophagy.

CASM events thus have largely associated with the control of immunological responses, notably in specialized phagocytes of the innate immunity. Since, canonical and noncanonical autophagy share multiple molecular components, reverse genetic experiments employing knockout mice to define the involvement of canonical autophagy in diverse diseases might represent CASM events. It became evident that the majority of genuine autophagic mechanism components also take part in other cellular activities, such as cytoplasmic trafficking, exocytosis, and unusual secretions to control cell growth, death of cells, and cell differentiation.

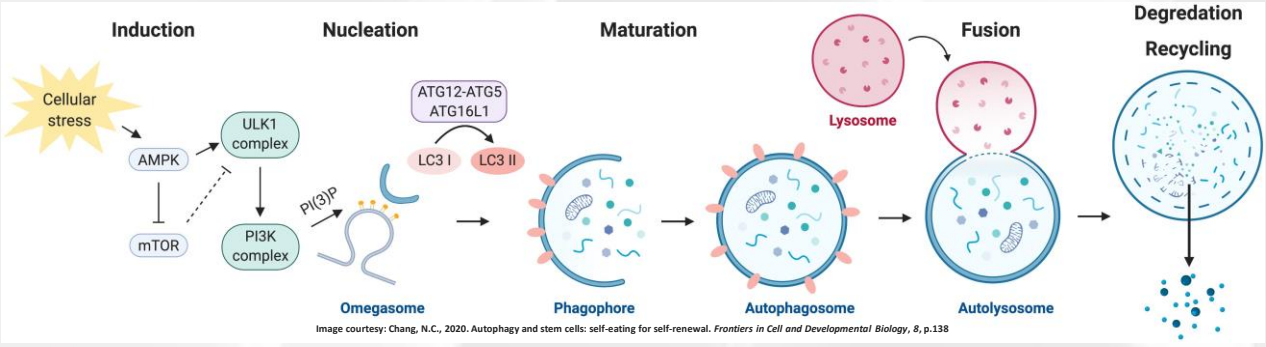

Image courtesy: Chang, N.C., 2020. Autophagy and stem cells: self-eating for self-renewal. *Frontiers in Cell and Developmental Biology*, *8*, p.138

Image courtesy:https://www.globalwomenconnected.com/

ATG8 is synthesised as a precursor protein with additional amino acids at their C-termini. These are proteolytically cleaved by cysteine proteases and finally attached to phospholipids rather than polypeptides resulting in protein-phospholipid conjugates that are supposed to be membrane-associated.

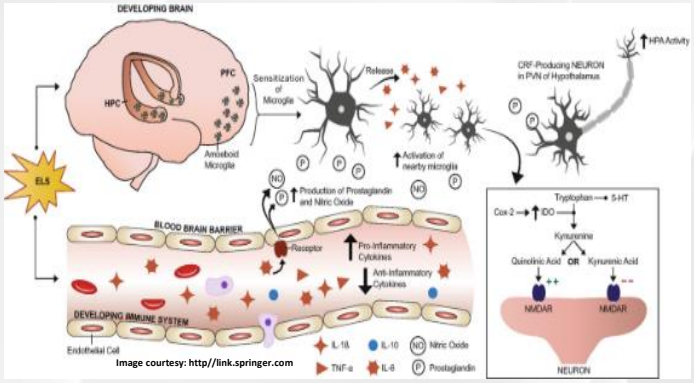

Image courtesy: http//link.springer.com

On the other hand, such initiatives could offer further pharmacological prospects for molecularly targeting certain pathways in cells of interest and avoiding the potential negative effects of upsetting key processes that protect the homeostasis and functionality of other cell types. CASM is shown via LC3-associated endocytosis to recycle putative-amyloid receptors in microglia cells, reduce neuroinflammation, and guard from Alzheimer's disease in mice.

To break down the elements of the numerous autophagy processes and comprehend where and when they are active, it is crucial to establish their importance in the pathophysiology of distinct illnesses and effectively modulating them in therapeutic contexts is crucial.

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Shashank S K
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BIOCHAR: AN ECOLOGICAL SOLUTION

Biochar is an organic substance with a high and stable organic carbon content that is created by pyrolyzing various types of feedstocks. The source, feedstocks, and pyrolysis procedures that were utilised to make the biochar will all have an impact on the physical and chemical characteristics of the final product.

Due to their distinctive properties and wide range of uses in industries such as energy, materials, agriculture, and the environment, particularly in the phytoremediation of diverse organic, inorganic, and heavy metal pollutants, carbon nanomaterials have recently been developed as potent instruments.

Additionally, it describes biochar as a low-density organic carbonaceous product formed by the pyrolysis of organic materials in low-oxygen environments, where co-produced biogas and biooils can be used as a source of energy. Instead of completely combusting to carbon dioxide, it needs to undergo a transformation into a charcoal-like product under low oxygen conditions. This causes the production of "char" a solid residue rich in carbon.

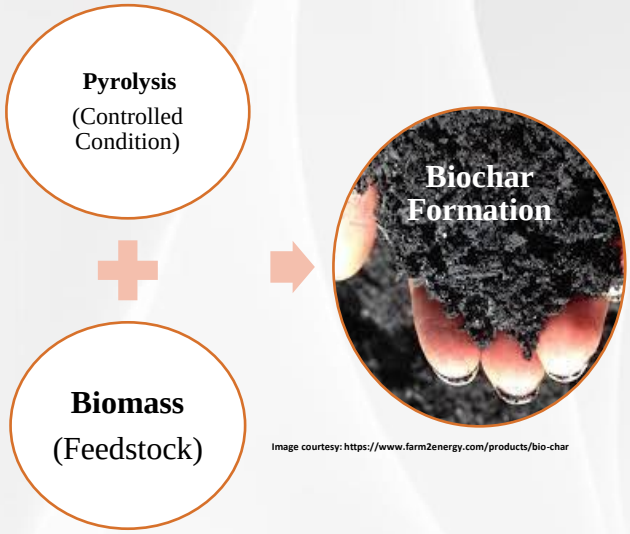

Image courtesy: https://www.farm2energy.com/products/bio-char

Numerous research have been conducted recently on the impact of biochar on the quality of agricultural soil and crops. By altering the physicochemical characteristics of the soil, the use of biochar might have an indirect or direct impact on the microbiological state of the soil. In addition to raising the pH of the soil, biochar can also enhance the organic matter and nutrients in the soil, which in turn affect crop yield and quality.

The volatilization of several chemicals during the preparation process gives biochar a loose and porous structure, and it also greatly increases the surface area of the material. Applying biochar can improve soil's ability to hold water, lower bulk density, and loosen the soil, all of which are conducive to plant growth. According to its pyrolytic temperature and raw material, biochar is often alkaline.

Biochar, a relatively light and porous carbon-rich material created by burning biomass in an oxygen-poor environment, can function as a sponge and serve as a home for a number of advantageous soil bacteria that have been shown to enhance the health of the soil and plants.

The biomass of the soil's microbial population can be used to measure ecosystem production and soil fertility. By maintaining the fundamental functions of healthy soil through soil carbon and nutrient cycling, soil microbial diversity and abundance, or biomass, play a crucial role in ecosystem sustainability. Micronutrients and carbon are abundant in biochar, which promotes microbial development. With a large specific surface area and a loose pore structure, it can offer a good and favourable environment for microbial growth while also protecting some of the microbial species that

live in the pores from predators. This effectively increases soil microbial activity and increases microbial biomass and diversity.

Apart from this, increased carbon storage and improved soil fertility are the main advantages of applying biochar. There is still a lack of knowledge regarding how biochar interacts with biological processes, especially how it directly affects soil bacteria. An interaction analysis comprehensively demonstrated that the type of microbial inoculants affects how biochar affects soil enzyme activity involved in N and P cycling. Additionally, the type of biochar amendment affects the microbial effect.

There are contaminant residues in aquatic systems as a result of the usage of numerous pharmacological and hormonal medications. Antibiotics are classified as high-risk environmental toxins because of antibiotic resistance and the resulting harm to human health. Nano biochar, created from wheat straw at high temperature and then pulverised to smaller than 1 m in size, is used to remove sulfamethazine from quartz sand. At acidic or neutral circumstances, sulfamethazine was shown to be less readily adsorbable by charcoal, and its mobility was found to increase.

Modern-day challenges can now be solved sustainably and thanks to the development of advanced nanostructured materials as “Nanobiochar”.

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Dr. Mansi Mehta
Assistant Professor
Department of Biotechnology, VNSGU, Surat

Brief Profile of Dr. Mansi Mehta

Dr. Mansi completed her graduation, post graduation as well as Doctor of Philosophy in Biotechnology from Department of Biotechnology, Veer Narmad South Gujarat University, Surat. Currently she serves as Assistant Professor, Department of Biotechnology, VNSGU, Surat, since 2016. She published many research papers in peer reviewed national and international journals. She has presented several papers at regional/state/national level conferences. She has also contributed for many book chapters. Her work entitled “Incorporation of Biocolours in Textiles: An Eco Friendly Approach” presented at National Conference on Innovating for Development and Sustainability on held at Navrachana University, Vadodara during 30-31st October, 2015 was awarded as best paper. She is also project convener at Sayaji Vaibhav Library, Navsari.

CELLULAR GLUE – CUSTOMIZED ADHESION MOLECULE

Cells are the fundamental components of all living things in our minds. Highly specialized cells make up every organ, including our brain, intestines, and skin. However, most of our body's cells are adhered by proteins to create intricate structures rather than merely floating around freely. Researchers have now discovered "cellular glue, "a technique to program which cell types and how firmly they adhere to each other using molecular engineering. The main objective of regenerative medicine is to create the tissues and organs, which has been significantly advanced by this finding. They anticipate that this "cellular glue" will cure various illnesses, including some of the most challenging diseases like cancer and neuronal damage etc.

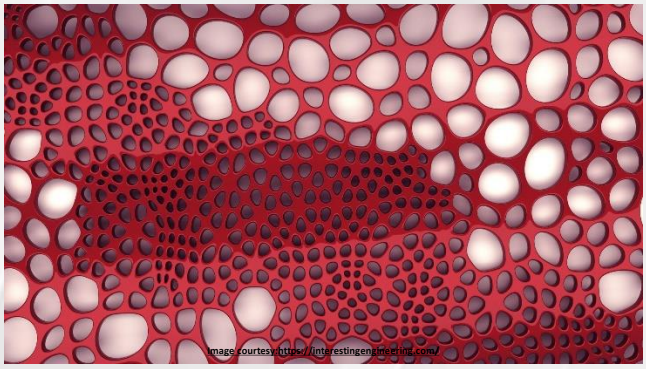
The body naturally contains adhesive molecules that hold the tens of trillions of cells together in intricate patterns. Cell adhesion molecules are a collection of proteins found on cell surfaces that mediates these sticky connections. Fortunately, these adhesion molecules belong to separate families with adhesive bonds ranging in intensity from strong binding involved in maintaining tissue architecture to more transitory, less avid, dynamic interactions seen in leukocyte life.

Adhesion molecules are very flexible cell surface receptors that bind cells together and helps to transmit biochemical as well as physical signals that control a wide variety of unique processes, including cell division, gene expression, differentiation, death, and migration. They generate neuronal circuits, form structures, and direct immune cells toward their intended targets. Stevens and his colleagues reported on which types of cells adhered to one another and how strongly the link was made by fiddling with various cells from various organs and their surface adhesion molecules.

Novel manipulated synthetic molecules are being developed to coax cells within the human body to bond with one another. These molecules are expected to act like natural adhesive molecules This will open the door to build novel structures like tissues and organs.

Things will get worsen in the body when cellular adhesion fails. Neurodegenerative illnesses like Alzheimer's have been linked to dysfunctional adhesion molecules. They may also contribute to immunological disorders including Crohn's disease and rheumatoid arthritis and treating these disorders at the cellular level has been challenging.

By combining orthogonal extracellular contacts with intracellular domains from native adhesion molecules, like cadherins and integrins, a variety of synthetic cell adhesion molecules (synCAMs) are produced. The researchers divided the design of their adhesion molecules into two portions to explain the aspects of cell interaction. On the outside of the cell, one part of the molecule functions as a receptor and chooses which other cells it will contact. The strength of the bond that formed is tuned by a second component located inside the cell. The two parts are interchangeable in a modular method to produce specialized cells that bind in various ways across various cell types.



Researchers were able to engineer cells with specially designed adhesion molecules that allowed them to control which cells they interact with and to control the nature of that interaction to create complex multi-cellular ensembles. While many homotypic or heterotypic external contact domains independently define cell connection, the synCAM intracellular domain identity predominates in defining interface morphology and mechanics.

These orthogonal adhesion molecules provide a toolkit for the systematic modification of native tissues and the rationally programmed assembly of novel multicellular structures. Custom adhesion molecules may provide a more profound knowledge of how the transition from single to multicellular species began. Cell adhesion was a crucial milestone in the evolution of animals and other multi-cellular organisms. The modularity of synCAMs offers vital insights into the possible development of many cell-cell interactions. “Overall, these techniques provide solid new capabilities for multi-cellular organization research and cell and tissue engineering”.

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Ms. Divyasree Davuluri

M.Pharm

About Divyasree Davuluri

She completed her B.Pharm from Sri Padmavati School of Pharmacy, JNTUA & Master’s program in the Department of Pharmacology from the Faculty of Pharmacy, RUAS in the academic year 2022.

PADMA VIBHUSHAN DR. DILIP MAHALANABIS

Indian pediatrician born on November 12, 1934 in West Bengal who was renowned for developing oral rehydration therapy popularly known as ORS as a treatment for diarrheal illnesses. He worked at the Johns Hopkins University International Center for Medical Research and Training in Calcutta, India as a researcher he started studying oral rehydration therapy in 1966.

He was the first Indian registrar at the Queen Elizabeth Hospital for Children while he was still in UK. His work was based on oral rehydration treatment when he joined the Johns Hopkins University International Centre for Medical Research and Training (JH-CMRT) in Kolkata.

PIONEERING OF ORAL REHYDRATION THERAPY

An enormous crisis resulted from the start of the Bangladesh fight for independence, with the majority of the refugees finding shelter in India. With a mortality rate of 30%, cholera swiftly became a leading cause of death amidst the malnourished and weary migrants. Professional and paramedical employees were dispatched to the refugee camps from the JH-CMRT to assist various organizations. With the help of their treatment facility situated in Bongaon, Dr. Dilip and his team conducted their work near the border between India and East Pakistan.

Due to the crisis there were no wards available and the floors were also occupied by the patients increasing utmost need for arranging a large space which could hold around 100 beds accommodating 3,50,000 refugees who lived in the city as well as its vicinity. Only 16 beds were available which were used as wards for cholera. In addition, they also faced problems regarding the recruitment of trained employees to administer the required volume of IV fluids.

Dr. Dilip thought that the oral rehydration therapy alone would suffice the crucial early stages in dehydration and i.v fluids would be required in case of severity during onsets of hypovolemic shock and severe acidosis. The composition in oral rehydration solution(ORS) was 22g of glucose, 3.5g of sodium chloride and 2.5g of sodium hydrogen carbonate per litre of water, all of which were readily available in his area. JH-CMRT prepared the glucose, and the components were measured out, sealed, and labelled in polyethylene bags.

This powdered concoction was mixed with potable water in drums and administered to patients. The price at which this was available at 11 paise/litre of solution with aid of all the local sources who supplied the components of ORS. Later on due to the ease of the therapy, the families of patients could also administer ORS to the patients.

Dr. Dilip Mahalanabis posthumously honoured with Padma Vibhushan for pioneering the wide use of Oral Rehydration Solution (ORS), a solution which has led to 93% reduction in deaths caused by diarrhoea, cholera and dehydration, especially among infants.

Children were given potassium orally, and coconut water was offered as well due to its high potassium level. Both adults and children were also given a tiny dose of tetracycline. In the separate tent, the CFR was even lower at 1%, but the situation was so bad that 50 % of the patients passed away before any oral rehydration therapy could even be administered. Over the course of an eight week period, he and his team administered this therapy to 3700 patients, and only 135 cases resulted in death, translating to a CFR of 3.6%. The mortality rate was reduced to a greater extent.

Dr. Dhiman Barua, Chief of the WHO's Bacterial Diseases Unit, visited the Mahalanabis-managed camp at this time and publicly began advocating for the management inside the WHO and UNICEF. Despite this, the scientific community was skeptical of Mahalanabis's approach, the original research which was done by him was rejected by many journals. It took seven years for oral rehydration therapy to be acknowledged as an effective method for treating dehydration caused by diarrhea and other illnesses. His ORS formula was never patented.

Although the medical community was initially not supportive, the WHO subsequently accepted ORS as recommended technique for treating cholera and other diarrheal illnesses. Currently, the ORS

formula is advised by the WHO consisting of sodium chloride, anhydrous glucose, potassium chloride, and trisodium citrate dihydrate. 29th of July is recognized as ORS day in India.

CONCLUSION

His demise on 16th October 2022 signifies the end of an era. The foundation of oral rehydration therapy is still being used to treat pediatric diarrheal illnesses. Intravenous fluid infusion was the only available treatment prior to the use of ORT, but it was neither convenient nor cost-effective. Dr. Mahalanabis' tireless work allowed ORT to become well-known.

Timeline

- **1975-79** – Worked in the cholera control unit of the WHO
- **1980s** – Worked as a consultant on bacterial diseases for the WHO
- **Early 1990s** – Worked as a medical officer in the Diarrheal Disease Control Programme of the WHO
- **1990** – Appointed as clinical research officer at the International Centre for Diarrheal Disease Research (ICDDR,B), Bangladesh
- **1994 –** Worked as a medical officer in the Diarrheal Disease Control Programme of the WHO
- **2002 –** Pollin Prize in Pediatric Research Award for contributions to the discovery of ORS
- **2004** – Worked on improved version of ORS
- **2006** – Prince Mahidol Prize, also for their role in the development and application of oral rehydration therapy

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Image courtesy: https://coaching4good.com/wp-content/uploads/2018/07/leaders-never-stop-learning.jpg

WEBINARS

Watch Us On YouTube

https://www.youtube.com/channel/UC0a59KLsIloDPmcNDL_U_tw

Department of Pharmacology, FPH, RUAS believes in supporting students and pharma fraternity with sharing knowledge and information apart from regular curriculum. Following webinars were conducted.

A Murine Model of Myocardial Ischemia-Reperfusion Injury Through Ligation of the Left Anterior Descending Artery

By Dr. M Mohamed Shabi
Professor & Head
Department of Pharmacology, IKON College Pharmacy, Bengaluru, Karnataka

A Review of Post COVID Complications

By Sunitha M
Associate Professor
Department of Pharmacy Practice, T John College of Pharmacy, Bengaluru, Karnataka

Career in Civil Service – In association with Vision IAS

By Sumit Jha - IPS
SP East Siang District, Pasighat, Arunachal Pradesh

A Clinical Pharmacist's Role in Managing Sodium Level of Patients in A Hospital Setting

By Dr. K T Saleem
Assistant Professor
Department of Pharmacy Practice
Manipal College of Pharmaceutical Sciences, MAHE, Manipal, Karnataka

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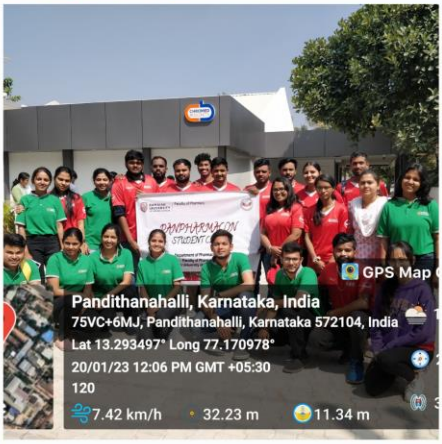
PANPHARMACON STUDENT CLUB RESEARCH ACTIVITIES



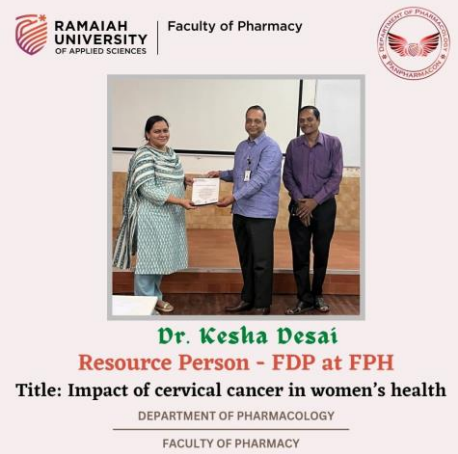
Industrial Visit to Chromed Biosciences Pvt Ltd, Tumkur

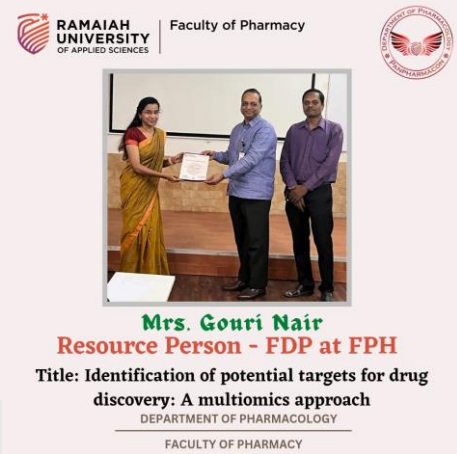
As a part of Research vertical of club, postgraduate research scholars visited Chromed biosciences, a preclinical laboratory. Dr. Rajesh, CEO of the company emphasized on various facilities provided by the firm to both academic and industry based research purposes. Students visited laboratories & animal housing facilities and learnt about animal health monitoring, *in vitro* and *in vivo* experimentation.

PANPHARMACON STUDENT CLUB ACADEMIC ACTIVITIES

National Pharmacist Day Celebration

Panpharmacon Student Club organized National Pharmacist Day – "Art of Pharma" event on 12th Jan 2023 and various competitions such as pharma model making, meme, reel making, drawing/painting were conducted. Evaluation was done by experts and prizes were distributed to winners.





Dr. Kesha Desai & Ms. Gouri Nair served as Resource person in the Faculty Development Program organized at FPH. Dr. Kesha Desai also presented alumni guest lecture at ROFEL Shri G M Bilakhia College of Pharmacy, Gujarat.

PANPHARMACON STUDENT CLUB ACADEMIC ACTIVITIES

Club members participated in Two Days Science Academies' Lecture Series at Ramaiah Institute of technology organized by Department of Biotechnology at RIT on 12th & 13th Dec 2022

As a part of Club's collaboration with VISION IAS academy, a complete set of books needed for UPSC preparation were provided by Vision IAS. The same was handed over to Dr. Mallikarjun, Chief Librarian, Faculty of Pharmacy for the utilization of UPSC aspirants.

RAMAIAH UNIVERSITY OF APPLIED SCIENCES | Faculty of Pharmacy
Department of Pharmacology

Club members volunteered and participated in workshop on Protection of Children Against Sexual Offences Act 2012(POCSO) & Gender Equality organized by NSS RUAS & Rotaract RUAS in association with Sakshi Foundation at RIT on 06th Jan 2023

Club members participated in two days book exhibition organized at Dwaraka auditorium on 27 & 28th September 2022 by Department of Library & Information Center, RUAS, Bengaluru.

PANPHARMACON STUDENT CLUB
ACADEMIC ACTIVITY

Samarthya

GPAT Mock Test Series

A Panpharmacon Initiative To Support GPAT Aspirants

Scan to register

NO Registration Fee

ELIGIBILITY

Pre final and Final year B.Pharm Students

WIN EXCITING PRIZES

NOTE: SIGN UP EITHER FROM ANDROID APP/WEB SERVER TO ATTEND THE EXAM.

EXAMINATION WILL BE CONDUCTED ABSOLUTELY AT FREE OF COST.

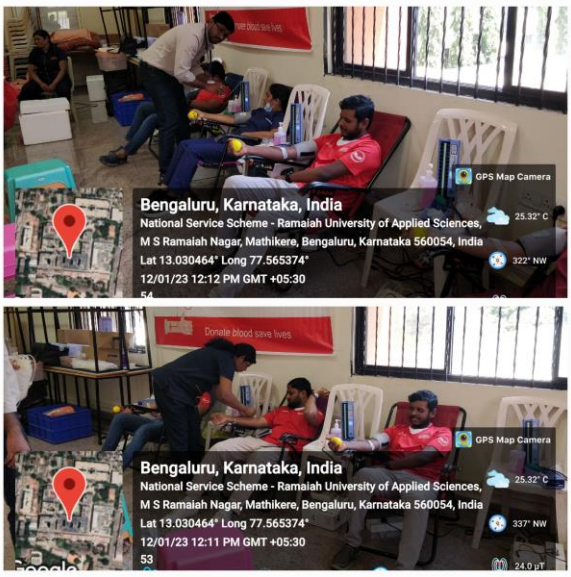
Panpharmacon Android App Download Link: GET IT ON Google Play

Web based examination link: https://panpharmacon.conductexam.com/

PANPHARMACON STUDENT CLUB COMMUNITY SERVICES

Team Panpharmacon joined hands with Rotaract RUAS and Rotary Bengaluru Manyata for health drive at J.P park organized on the account of world diabetes day on 26th November 2022

Team Panpharmacon participated in Traffic awareness rally organized by Indian Red Cross Society and Rotary Bengaluru Manyata on 17th November 2022



Panpharmacon volunteers donated blood in the blood donation drive organized by NSS RUAS on 12th January 2023

EVENTS

Team Panpharmacon participated in Yogathon 2022 World's Largest Yoga Health Movement by NSS Karnataka held on 15th January 2023 at Sri Kanteerava Indoor Stadium. The event was also attempted to Guinness book of World Record for maximum number of people performing yoga.

Christmas Celebration at Department of Pharmacology

Team Panpharmacon celebrated Christmas with lots of recreational and stress buster activities. It was a evening filled with gifts, happiness and joy.

UPCOMING EVENTS

WEBINAR ON CHROMOSOMAL DISORDERS

Session Highlights

- Duplication syndrome in the offspring
- Mosaicism
- Aberrant chromosome complements
- Peculiar genetic signals
- Chromosomal transmit
- Chromosomal imbalances

Speaker

Dr. Mansi Mehta

Assistant Professor
Department of Biotechnology,
VNSGU, Surat

27/February/2023

03:30 PM – 05:00 PM IST

Event Registration Link
Microsoft Teams

E-Certificate will be provided for participants

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

11/March/2023

03:30 PM – 05:00 PM IST

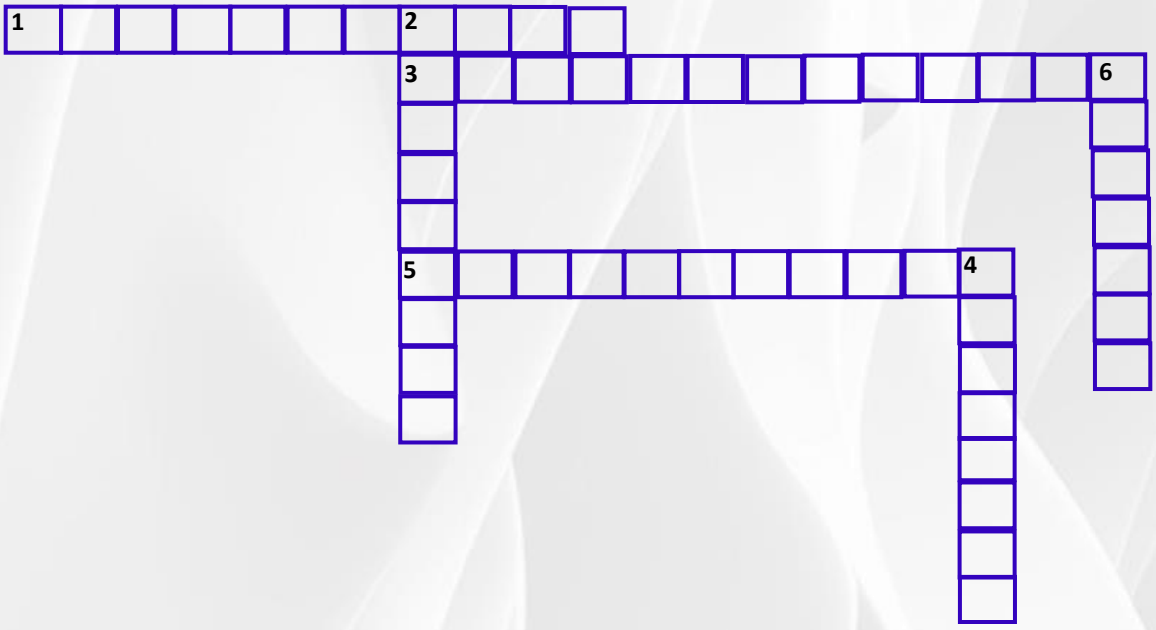
Event Registration Link
Microsoft Teams

E-Certificate will be provided for participants

Mind Lab

Solve the Crossword

Win Exciting Gifts!!!



Across

1. A 5HT 1D receptor agonist useful in migraine

3. Accumulation of which carbohydrate in lens produces cataracts in diabetes patient

5. _____is the drug that increases tissue sensitivity to insulin

Down

2. Potentially life-threatening allergic reaction caused by IgE

4. _____ Antimalarial drug is safe during pregnancy

6. _____ is the endogenous naturally occurring female hormone

Terms and conditions

- Mind lab – III consists of **Two** segments, Solved answers to be mailed to fphpanpharmacon@gmail.com on or before **15-March-2023**
- 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

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

Gantenerumab, Vutrisiran, Deucrivacitinib, Telepelumab, Ciltacel

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RECENT RESEARCH PUBLICATIONS

- **P. S. Ramya Krishna**, **Anbu Jayaraman, A. Damodar Nayak** and Moushumi Baidya., (2022) Toxicological Evaluation of Alginic Acid, a Polysaccharide Isolated from *Turbinaria conoides* (J. Agardh) Kutzing on Wistar Albino Rats. *Toxicology International*, 29(3) pp.363-377.

- **Thanuja N K**, Rahul Suresh, Sai Raksha, Kushboo. B., (2022) Overview On Classical And Current Treatment Approach Towards Acute Inflammatory Demyelinating Polyneuropathy (Aidp) (Guillain-Barre Syndrome). *International Journal of Scientific Development and Research* 7(12), pp.230-235.

- **Choekyila Ladingpa, Sameerana Hammigi**., (2022) AIWS (Alice in Wonderland Syndrome) Correlation with Migraine. *International Journal of Science and Research,* 11(12), pp.800-803.

- **Thanuja N K**, Bhumika M, Haneenulla, Sudatt Dixit, Sumona Purkayastha, Varun Kumar C J., (2022) *Echinacea Purpurea*: A Review on Bioactive Constituents and The Pharmacological Activity (Purple Cone Flower). *International Journal of Scientific Development and Research* 7(12), pp. 136-142.

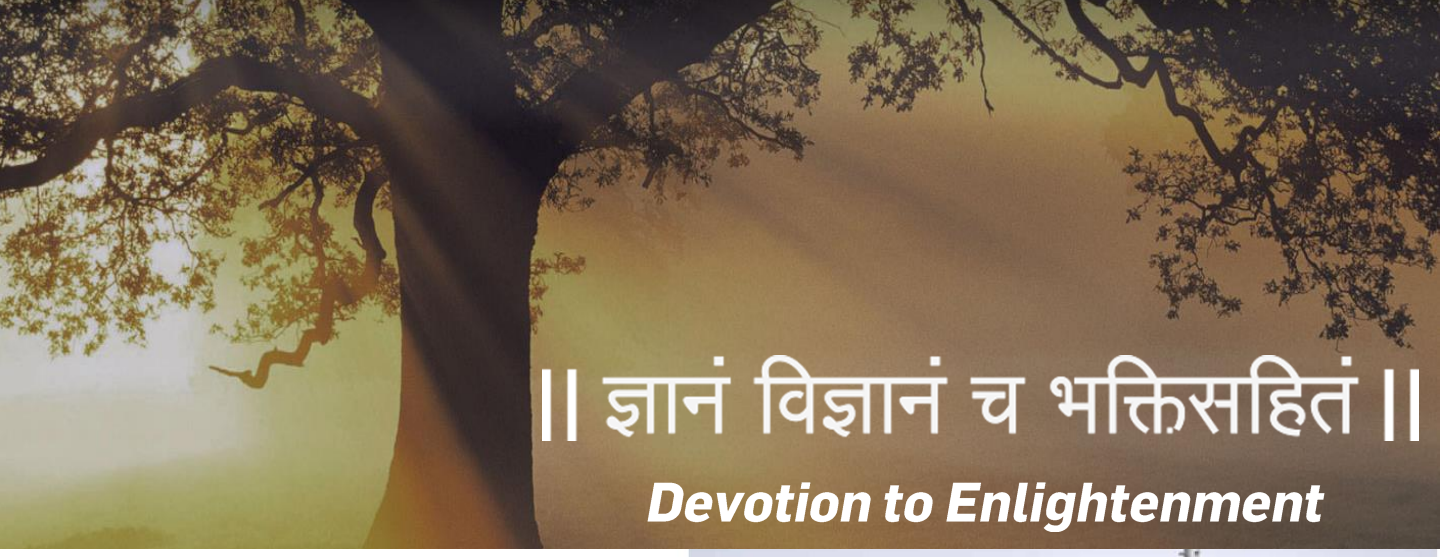
- **Sameera H R**, Deepika B V., (2022) A spy on costal plant-Mangrove: A review article. *International Journal of Pharmacognosy and Life Science*, 3 (2), pp. 27-31.

- **Manisha Devi**, G. Chaitanya Sai, **Damodar Nayak A**, Parasuraman P, Selvaraj K, **Anbu Jayaraman**., (2023) Identification of Lead Moiety to Treat Polycystic Ovarian Syndrome from *Ganoderma lucidum*: A Computational Approach. *Biointerface Research in Applied Chemistry*, 13(5), pp. 1-20.

- Marran, A. M., Thomas, B. E., Shaju, A. M., **Nair, G**., Haider, N., Mazhar, F. & Subeesh, V. (2023). 8 - medication errors case studies: Medication reconciliation errors. In: Al-Worafi, Y. M. (ed.) *Clinical case studies on medication safety*. Academic Press.

PRESENTATIONS & CONFERENCE ATTENDED

- **Ms. Thanuja N K** gave oral presentation on the topic “Development of antidiabetic transdermal patch through navel route of administration – a preclinical study” in International Conference on Pharmacology in Drug Discovery and Disease Management organised by Department of Pharmacology, Amrita School of Pharmacy, Amrita Vishwa Vidyapeetham, Kochi, Kerala held on 25th & 26th November 2022
- **Ms. Thanuja N K** completed the 6-week certificate course "Cardiology Series - 1: Basic Diseases. The Cardiology Series-1 was conducted as the first part of the "Super-speciality Learning Series in Cardiovascular Disease" by CliMed Research Solutions, India, in collaboration with World Youth Heart Federation (WYFH) - India from 4th September to 9th October 2022.
- **Ms. Thanuja N K** gave oral presentation on “In silico repurposing of FDA approved drugs for Anti-Cataractogenic Activity” in National Conference on Drug Discovery and *In silico* Drug Design on 18th November 2022 conducted by Royal Global University, Guwahati, India**.**
- **Panpharmacon club members** attended the National Conference on Drug discovery and *In silico* Drug Design on 18th November 2022 conducted by Royal Global University, Guwahati, India.
- **Mr. Shannon** gave oral presentation on a research paper "Drug Repurposing for Primary Lateral Sclerosis: A molecular docking and dynamics study" in International Conference on Current Trends in Drug Discovery Development held on 21st - 22nd October -2022 organized by K L College of Pharmacy, Andra Pradesh, India**.**
- **Dr. Manisha Devi** gave oral presentation on “Lead Identification from *Ganoderma lucidum* to Treat Polycystic Ovarian Syndrome: An In silico Approach” in International Conference on “Current Trends in Drug Discovery Development and Delivery” on 21st - 22nd October -2022 organized by K L College of Pharmacy, Andra Pradesh, India.
- **Dr. Manisha Devi** gave poster presentation on “Novel Lead Moiety to Treat Poly Cystic Ovarian Syndrome using *Ganoderma lucidum*: A Computational Approach” in National Conference on “Drug Discovery and *In silico* Drug Design” organised by Royal School of Pharmacy, Guwahati, Assam, India



|| ज्ञानं विज्ञानं च भक्तिसहितं ||

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