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FPH

Panpharmacon

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Department of Pharmacology

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Anniversary Edition

Faculty of Pharmacy

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Bengaluru, Karnataka 560054

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Editor's Note

Hello Readers !!!

This quarterly issue focus on recently published reports from different directions of health concerns globally. The Anniversary issue introduces "Imprint 👣", a section that introduces Pharmacists who left their remarkable foot prints in the field of Pharmacy. Apart from covering conventional informative scientific articles, the issue also features brain storming section for the readers, 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. Abin Chandrakumar & Ms. Vaishnavi Balraj for their contribution for this issue and to all other contributors for having put their thoughts and experiences into an engaging read.

For any queries, suggestions, feedback or submission of articles please do not hesitate to contact our team via 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 LOIHI CHIP - NEUROMORPHIC IMPLANTABLE CHIP TO IDENTIFY INCIDENCE OF SEIZURES

The computational building blocks within neuromorphic mechanism are logically analogous to neurons. Spiking Neural Networks (SNNs) are an innovative model for arranging those elements to follow natural neural networks that exist in biological brains. Each neuron in the SNN can fire independently of the others, and doing so, it sends pulsed signals to other neurons in the network that directly change the electrical states of those neurons. By encoding information within the signals themselves and their timing, SNNs simulate natural learning processes by vigorously remapping the synapses between artificial neurons in response to stimuli. The Loihi chip comprises a total of 1,30,000 neurons, each of which can interconnect with thousands of others. Developers can access and manipulate on-chip resources programmatically by means of a learning engine that is implanted in each of the 128 cores. Because the hardware is optimized specifically for SNNs, it supports dramatically accelerated learning in unstructured environments for systems that require autonomous operation and continuous learning, with extremely low power consumption, plus high performance and capacity. Neuromorphic engineering bridges the gap between artificial and natural intelligence. The scientists of University of Zurich, were able to develop a technology to successfully detect previously recorded High-Frequency Oscillations (HFOs).

"Success in creating AI would be the biggest event in human history. Unfortunately, it might also be the last, unless we learn how to avoid the risks"

Stephen Hawking
Theoretical Physicist

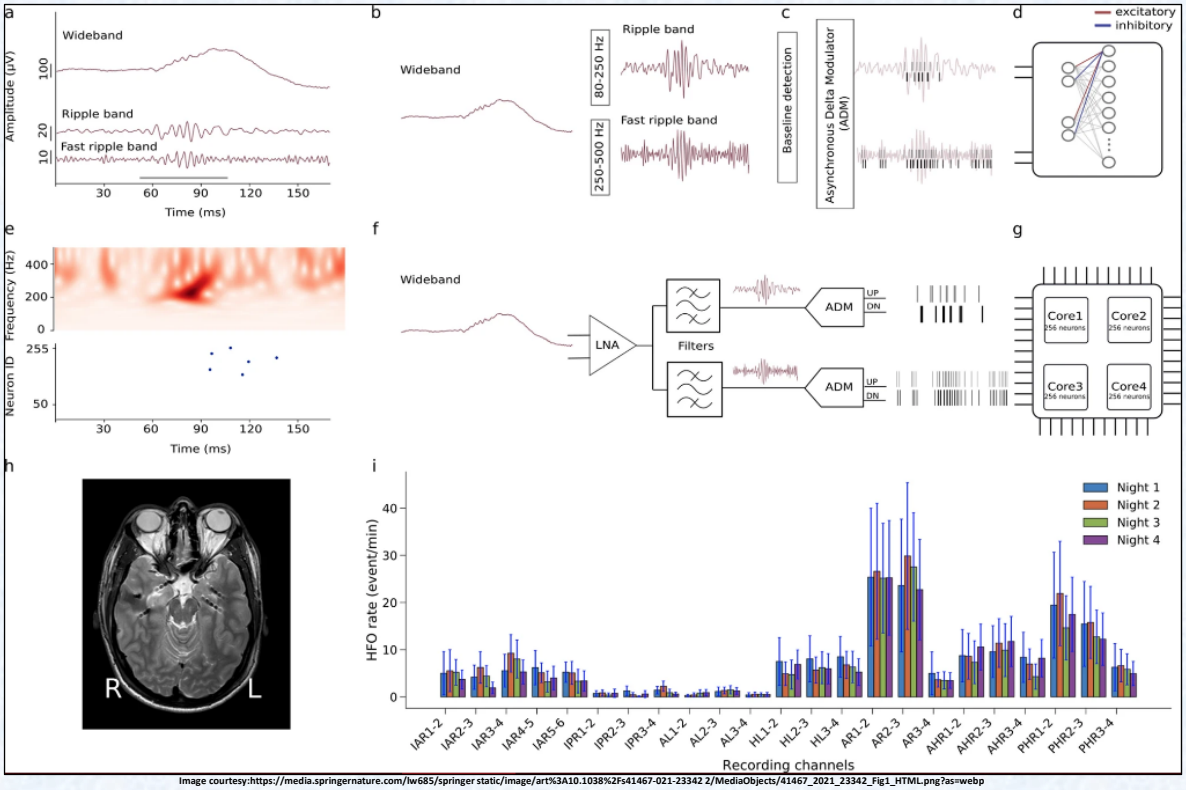

Image courtesy:https://media.springernature.com/lw685/springer static/image/art%3A10.1038%2Fs41467-021-23342 2/MediaObjects/41467_2021_23342_Fig1_HTML.png?as=webp

Fig: Automatic HFO detection using a bio-inspired SNN.

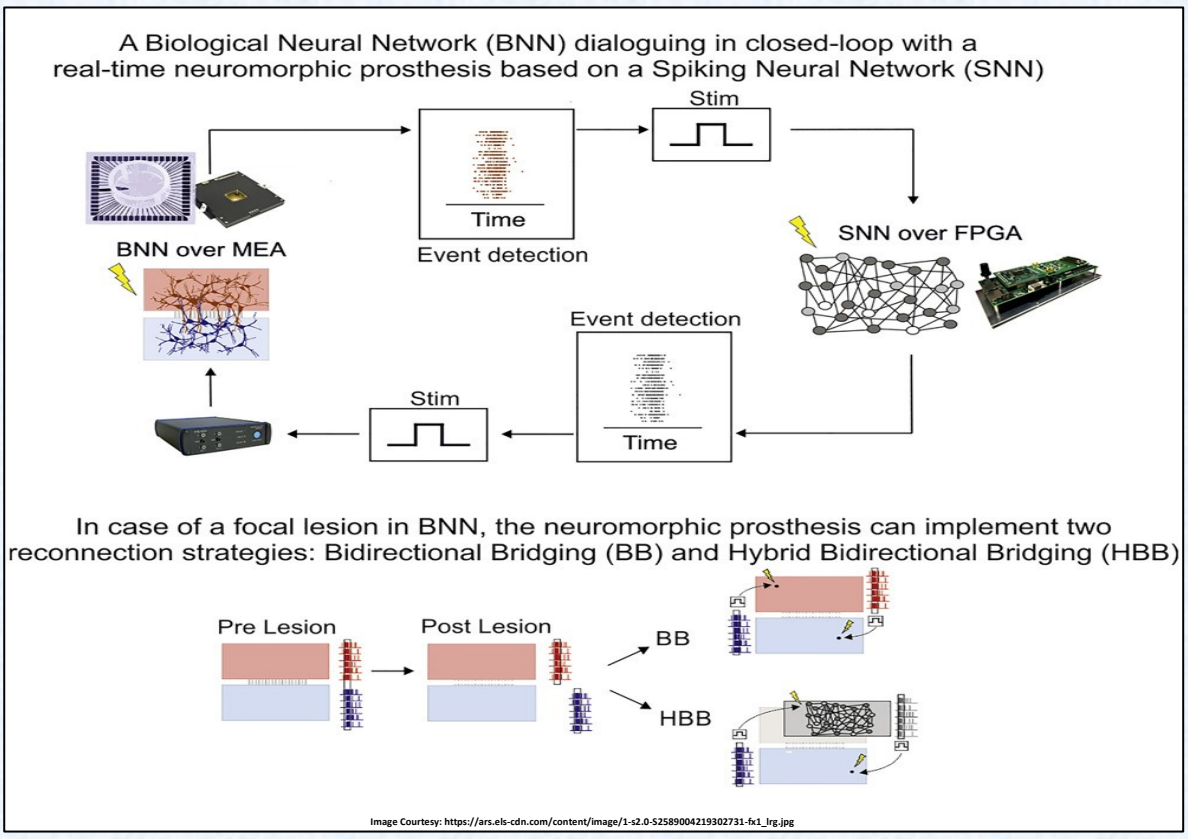

Fig: A Neuromorphic Prosthesis to Restore Communication in Neuronal Networks

These specific waves, measured using an intracranial electroencephalogram (iEEG), have proven to be promising biomarkers for identifying the brain tissue that causes epileptic seizures. The researchers first designed an algorithm that detects high-frequency oscillations by simulating the brain's natural neural network: a tiny so-called Spiking Neural Network (SNN). The second step involved implementing the SNN in a fingernail-sized piece of hardware that receives neural signals by means of electrodes and which, unlike conventional computers, is massively energy efficient. This makes calculations with a very high temporal resolution possible, without relying on the internet or cloud computing.

Giacomo Indiveri- a lead researcher describes that "Our design allows us to recognize spatiotemporal patterns in biological signals in real time. The researchers are now planning to use their findings to create an electronic system that reliably

"Spiking Neural Networks (SNNs) are an innovative model for arranging computational building blocks within neuromorphic mechanism to follow natural neural networks that exist in biological brains"

recognizes and monitors HFOs in real time. When used as an additional diagnostic tool in operating theatres, the system could improve the outcome of neurosurgical interventions. The team's ultimate target is to develop a device for monitoring epilepsy that could be used outside of the hospital and that would make it possible to analyse signals from a large number of electrodes over several weeks or months. Researchers integrated low-energy, wireless data communications in the design—to connect it to a cell phone, with a portable or implantable chip,

which could identify periods with a higher or lower rate of incidence of seizures, which would enable us to deliver personalized medicine. Also Researchers from Intel Labs and Cornell University demonstrated the ability of Intel's neuromorphic research chip, Loihi, to learn and recognize hazardous chemicals in the presence of significant noise and occlusion.

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Sharifshazileh, M., Burelo, K., Sarnthein, J. and Indiveri, G., 2021. An electronic neuromorphic system for real-time detection of high frequency oscillations (HFO) in intracranial EEG. *Nature communications*, 12(1), pp.1-14.

Buccelli, S., Bornat, Y., Colombi, I., Ambroise, M., Martines, L., Pasquale, V., Bisio, M., Tessadori, J., Nowak, P., Grassia, F. and Averna, A., 2019. A neuromorphic prosthesis to restore communication in neuronal networks. *Science*, 19, pp.402-414.

Ms. Pakija Nasreen
M.Pharm
Department of Pharmacology

VAPE FLAVORINGS CAN HARM THE HEART, MORE THAN WHAT NICOTINE ALONE CAN DO!!!

Flavoured e-cigarettes are partially banned by many governments with an intention of preventing youngsters vaping flavoured e-cigarettes with prefilled cartridges. Meanwhile, disposable e-cigarettes consumption became very common among youngsters because of its dessert and fruity like flavours. According to the Centre for Disease Control and Prevention, 3.6 million youngsters in the US were reported to use e-cigarettes in the year 2020. Every eight of ten youngsters were known to prefer flavoured varieties because of its appealing nature.

"e-cigarettes are known to contain relatively equal amount of nicotine compared to that of tobacco products. It is unfortunate that public believes its safer compared to tobacco products which is a misguiding information as they both are equally addictive"

Image courtesy: https://www.express.co.uk/life-style/health/974818/vaping-e-cigarette-heart-attack-stroke

The array of this appealing fruit and candy flavours of e-cigarettes luring a large number of youngsters were reposted to be associated with significant damage to heart as per a research report by University of South Florida Health. In vaping, an e-liquid comprised of nicotine, flavorings and solvents like vegetable glycerin, propylene glycol is converted into an aerosol by heating. Battery powered vaping device helps heating and convert the e-liquid into e-vapor, i.e., an aerosol which is smoke like. e-cigarettes are generally known as a tool that helps in the deaddiction of nicotine. However, they are not approved by FDA as evidence for an effective cessation of smoking is not proven. Also, the e-cigarettes are known to contain relatively equal amount of nicotine compared to that of tobacco products. It is unfortunate that public believes its safer compared to tobacco products which is a misguiding information as they both are equally addictive.

The toxicity of various flavours of e-liquids such as vanilla custard, fruit flavour, cinnamon was evaluated by researchers in cardiac myocytes of mice. All the three flavours were found to induce

significant toxicity to the cell culture. Human pluripotent cells derived from cardiac myocytes were similarly tested with three different e-vapors. A blank e-vapor containing solvent alone was reported to interfere with electrical activity of cardiac cells. Nicotine and solvent containing e-vapor was observed to increase the toxicity to the cardiac cells furthermore in vitro. In another test nicotine, solvent and flavour combination of e-vapor was tested the same way. Among the three flavours, vanilla custard flavour was chosen for the test as it was previously reported to be highly toxic among the three flavours mentioned earlier. It was observed that the presence of flavour in the e-vapor significantly augmented the damage to the cardiac myocytes compared to nicotine alone. Thus, it is suggested that flavouring chemicals present in vaping devices play a significant role in the damage of heart more than what nicotine alone can do. They are nowhere lesser than tobacco products in harming the health.

Reference:

Abouassali, O., Chang, M., Chidipi, B., Martinez, J.L., Reiser, M., Kanithi, M., Soni, R., McDonald, T.V., Herweg, B., Saiz, J. and Calcul, L., 2021. *In vitro* and *In vivo* cardiac toxicity of flavored electronic nicotine delivery systems. *American Journal of Physiology-Heart and Circulatory Physiology*, 320(1), pp.H133-H143.

Ms. Heena Kousar
M.Pharm
Department of Pharmacology

HAVE I SEEN THAT FACE BEFORE ?

Our brain works just like our e-mail box i.e., segregating the received information as important, starred and even discarding the unimportant ones in the bin. Recognising anyone's face is an essential task which was assumed to be performed by single cells in 1:1 ratio (one cell remembers one person), however this hypothesis has been proven wrong by Winrich Friewald and colleagues from The Rockefeller University.

Bunch of images were shown to two rhesus monkeys that had both familiar and unfamiliar faces. As they were seeing the images, electric signals from their temporal pole region of brain were recorded along with zooming the region using magnetic resonance imaging (MRI). It was observed that a group of neurons in the temporal region responded strongly towards the familiar images than the unfamiliar ones. Along with this the cells could quickly differentiate between the known and unknown faces.

Even though the monkeys were relentlessly shown the unfamiliar faces, their response was still three times stronger while seeing the images of the individual they met in-person. This tells us that no matter how often we see anyone virtually we tend to remember that person whom we have met personally.

It was proven that recognising someone is not by one cell instead it is a group of cells which collectively code for one familiar face. Researchers look forward to perform the study on human brain and this could help those 1 % people who suffer from face blindness and eventually undergo social isolation and depression.

So, for all the readers whenever you are unable to recognize someone just blame these cells.

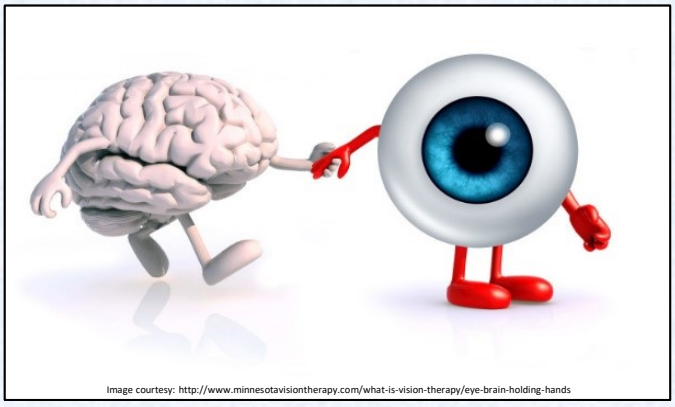

Image courtesy: http://www.minnesotavisiontherapy.com/what-is-vision-therapy/eye-brain-holding-hands

"Our brain works just like our e-mail box i.e., segregating the received information as important, starred and even discarding the unimportant ones in the bin"

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Ms. Pratiksha Rai
M.Pharm
Department of Pharmacology

DOES STRESS LEAD TO PREMATURE GREYING OF HAIR ?

Hair greying is a universal feature of human biological senescence and its reversibility remains ambiguous. The onset of hair greying differs between individuals depending upon the genetic makeup, bio-behavioural aspects and also the nature of individual hair follicles.

The colour of hair is influenced by melanin producing cells known as melanocytes. Melanocyte stem cells (MeSc) present within the hair follicles produce new melanocytes giving pigmentation to hair. However, these stem cells are lost gradually during aging leading to loss of hair pigmentation. Hence, depigmentation of hair can be caused by defective melanin synthesis, loss of differentiated melanocytes and depleted melanocyte stem cells.

Age, hereditary, nutritional deficiencies are some of the causative factors of hair depigmentation. Research have shown hair greying is also associated with systemic diseases like coronary artery disease, osteopenia and hypothyroidism. Stress has a diverse set of undesirable effects on the functioning of body. Although, the association of stress with greying of hair in humans is not scientifically documented, it is postulated that stress affects greying of hair. Dr. Ya-Chieh Hsu from Harvard University led a team of researchers in examining the link between stress and hair greying in mice. They exposed the black C57/BL/6J mice to 3 types of stress which included chronic restraint stress, unpredictable stress and injection of resiniferatoxin (RTX). All the varieties of stress led to the declining of melanocyte stem cells causing depigmentation of hair. Earlier hypothesis was postulated stating that the immune attack resulted in the stress induced hair greying. However, it was found that the depigmentation of hair was not associated with the immune cells. Although, the corticosterone level was elevated in the stress induced mice, it did not show any impact on the pigmentation of hair. On the other hand, the increased norepinephrine influenced the hair greying. It acted through the ADRB2 (Adrenoreceptor Beta2) gene present in the MeSCs

"Depigmentation of hair can be caused by defective melanin synthesis, loss of differentiated melanocytes and depleted melanocyte stem cells"

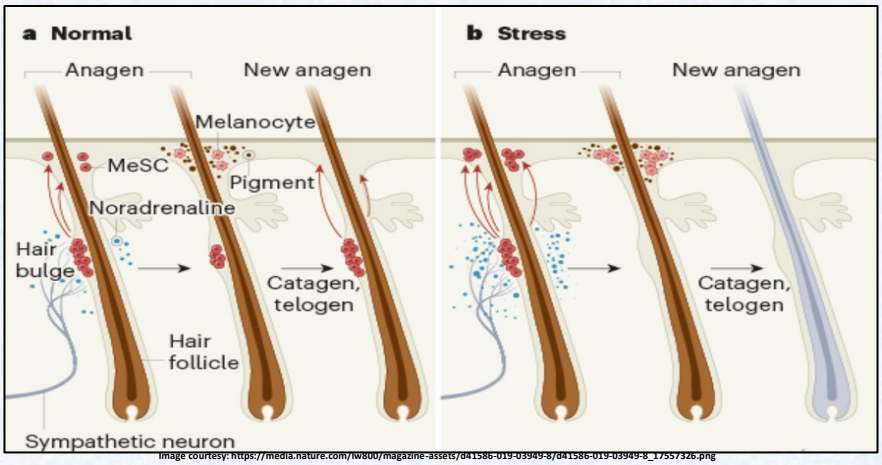

Image courtesy: https://media.nature.com/lw800/magazine-assets/d41586-019-03949-8/d41586-019-03949-8_17557326.png

Fig: Represents the hair follicle cycle during normal and stress condition

and mediated the stress-induced depigmentation. Their findings suggested that norepinephrine was capable of causing hair greying even in the absence of stress. Their study also revealed that the norepinephrine from the adrenal gland had no relation with the greying of hair but the norepinephrine produced from the highly activated sympathetic nerve terminals under stress conditions led to the depigmentation. Stress also led to the proliferation of MeSCs and resulted in hair loss.

Hence, it can be concluded that highly stressful conditions lead to over activation of sympathetic neuronal activities initiating the MeSC depletion. Furthermore, research regarding the decline of MeSC and other mechanisms underlying the depigmentation due to stress will provide better knowledge about the premature hair greying process. Finally, it opens up the possibilities for reversing the greying process.

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Zhang, B., Ma, S., Rachmin, I., He, M., Baral, P., Choi, S., Gonçalves, W. A., 2020. Hyperactivation of sympathetic nerves drives depletion of melanocyte stem cells, *Nature*, 577, pp. 676-681.

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Ms. Anusha Shrinarayan
M.Pharm
Department of Pharmacology

THE SCIENCE BEHIND ADDICTION

Addiction is amongst a major global humanitarian crisis, millions and millions of people around the world are suffering from addiction. It is also amongst the most stigmatized condition in the world & hence is also a social evil. We all know what addiction is but have you ever wondered the science behind addiction? Let's try to understand addiction with more scientific approach.

What is addiction?

Addiction is the willingness of a person to do something again and again for temporary pleasure. A general perception of people being addicted to drugs is common, but also addiction can be with respect to alcohol, smoking, sex, work, or anything. Many people consider addiction to be a mental weakness or lack of will to leave a habit that is harmful in some or the other way but there's something more scientific about addiction lets understand “The Science Behind Addiction”

You must have felt happy when your mom cooks something you love ‘Feels rewarding right?’ Why not there is a whole rewarding system present in your brain which releases happy hormones that makes you feel joyful and overwhelmed. But remember this rewarding system is not always a boon!! It triggers you to do something again and again for that temporary pleasure you get due to the release of hormones and that's what addiction is!!

There is a Mesolimbic system present in the brain (a group of dopaminergic neurons that release Dopamine) that projects from the ventral tegmental area (present in the midbrain) to the ventral striatum which is one of the component pathways of the medial forebrain bundle, all this together mediates the brain rewarding stimulus.

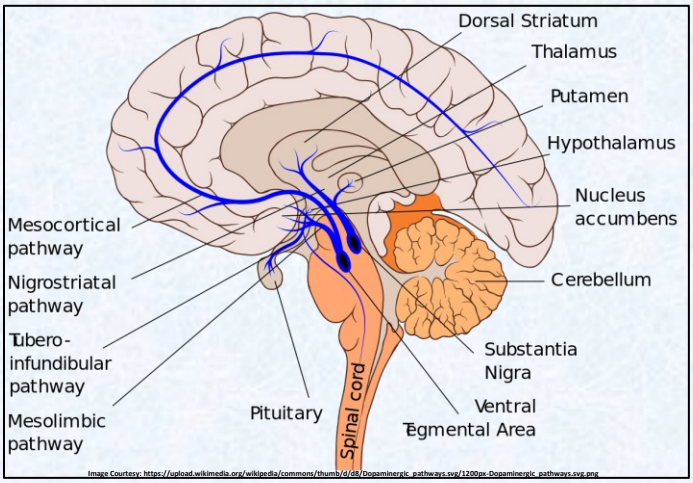

Fig: Dopaminergic Pathway in Brain

“Modern neurological techniques states that addiction is more of a neurological disorder. So rather than considering it to be a stigma let's unite and fight against addiction”

The mesolimbic system is responsible for motivation, reinforcement learning, and fear, among other cognitive processes. When there is the release of the dopamine hormone due to a stimulus, the mesolimbic system records it and releases a sense of happiness or satisfaction. So whenever you do it again there is release of Dopamine and you feel rewarded. Dopamine is considered to be the ‘HAPPY HORMONE’. That's what happens in addiction whenever there is a stimulus there is an increase in the happy hormone levels. Either the substance blocks the reuptake of dopamine like in the case of cocaine or induces the release of excess dopamine like in the case of amphetamine, we feel rewarded.

Because, this triggered mesolimbic system triggers and motivates the brain to do it again and again, leading to addiction. Modern neurological techniques states that addiction is more of a neurological disorder. So rather than considering it to be a stigma let's unite and fight against addiction.

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Strathearn, L., Mertens, C. E., Mayes, L., Rutherford, H., Rajhans, P., Xu, G., Potenza, M. N. & Kim, S., 2019. Pathways relating the neurobiology of attachment to drug addiction, *Frontiers in psychiatry*, 10 (737).

Mr. Mayur Jain
B.Pharm
Faculty of Pharmacy, RUAS

POLYGENIC SCORE BASED EMBRYO SELECTION FOR SMARTER EMBRYO

The past recent years have brought vital breakthroughs in understanding human genetic science like a polygenic score. It is also known as a polygenic risk score, or genetic risk score, or genome-wide score in genetics, and it represents the total number of genetic variations that a person possesses in order to determine their heritable risk of getting a disease. Polygenic scores are resultants of large genome-wide association that helps to describe the unpredictability perceived in complex human traits, such as height or cognitive ability. The ability of preimplantation genetic examination to check the complete genome of a human embryo has elevated the spectre of "smarter babies" where probable parents select embryos based on qualities, they find necessary. The polygenic scores produce the potential for existing embryo choice technologies to be adapted to choose from a wider array of expected genetically influenced characteristics as well as continuous traits.

“The ability of preimplantation genetic examination to check the complete genome of a human embryo has elevated the spectre of "smarter babies" where probable parents select embryos based on qualities, they find necessary”

The worldwide experts portray the limitations of Embryo Selection based on Polygenic Scores (ESPS) and risky alerts to the patients. ESPS proposed to decide for a trait which prompts the unplanned assurance of adversarial attributes. They alert about the ability of ESPS to change public economics, compound regulatory aberrations and cheapen certain characteristics. If ESPS continues being open to IVF patients, the designers require an overall wide conversation about the ethical use of the development and control of it. Polygenic scores are assumptions for remarkable success and various outcomes are from genome-wide alliance. Polygenic scores have been shown in adults, to anticipate those outcomes. As the makers explain their provident power is basically diminished while standing out undeveloped life forms from one another. Polygenic scores are as of now delicate pointers for most individual adult outcomes, especially for social and conduct credits, and there are a couple of variables that cut down their provident power essentially more concerning early-stage organic entity decision. Polygenic scores are professed to work in a startling setting in contrast with an IVF focus. These fragile markers will perform well beyond what might be expected all the more terrible when used in human beings.

Different associations are presently working with IVF centers to offer ESPS to patients who need to get an early-stage organic entity with a lower chance of diabetes, coronary disease, combustible gut contamination, Alzheimer's affliction and schizophrenia than various undeveloped organic entities. Associations can offer ESPS for getting early stage living beings according to their expected informational achievement, family pay and mental status. But the main disadvantages of ESPS to work is polygenic scores should give passably exact assumptions for whether the resulting individuals will have a particular characteristic or not. The genome-wide affiliation contemplates that create the polygenic scores now and again recommend moderate or even enormous contrasts in genuine results between individuals with high versus low polygenic scores, however those distinctions depend on an example

of individuals from various families. Nonetheless, ESPS typically includes contrasting individuals from a similar family, which altogether brings down the prescient force of polygenic scores.

ESPS generally incorporates differentiating people from a comparable family, which essentially cuts down the provident power of polygenic scores. Besides, for quantifiable reasons, genome wide alliance contemplates are driven with people with similar families. Tragically, for a collection of reasons the current assessments have vastly included people with European family lines.

Appropriately, most polygenic scores assembled today will be less provident for people of various families. Finally, evaluations of the understanding power of polygenic scores ordinarily acknowledge a lot of like conditions for the age that had a go at the primary genome-wide association study and the age that will be brought into the world due to ESPS. Regardless, when a lacking life form picked by ESPS is an adult, they might stand up to an inside and out various environment, which will cut down provident power. Whether or not the confined sufficiency of ESPS is exactly passed on to patients, certain use of ESPS raises various risks. For instance, the researchers alert that usage of ESPS could support up existing prosperity and various irregularities, as ESPS is large open to some wealthy European legacies. ESPS may similarly escalate the inclination and partition by blurring the current people with characteristics that caretakers select against are less critical. But in the U.S., there is a strong valid and good custom of overview that regenerative decisions is an issue of individual choice. The association should help agreeable verification to guarantee about the ordinary benefits of ESPS and what incorporates as adequate information openness in this special situation. The investigators besides call for capable clinical social orders to transient plans and for the associations to show the information they have provided for customers is known. They likewise say

Fig: Select smarter and healthier embryo through genetic scoring

there must be an overall population wide conversation about whether using existing certified designs to ensure exact information about ESPS or not

Reference:

Turley, P., Meyer, M.N., Wang, N., Cesarini, D., Hammonds, E., Martin, A.R., Neale, B.M., Rehm, H.L., Wilkins-Haug, L., Benjamin, D.J. and Hyman, S., 2021. Problems with Using Polygenic Scores to Select Embryos. *New England Journal of Medicine*, 385(1), pp.78-86.

Ms. Thanuja N K
M.Pharm
Department of Pharmacology

CANADIAN PHARMACIST LICENSE: REGISTRATION PROCESS FOR FOREIGN PHARMACY GRADUATES

Canada is an advanced nation with universal healthcare, which has proven to be an alluring place for many internationally pharmacy graduates (IPGs). Canada has about 42,500 licensed pharmacists, 70% of them work in community pharmacies, 15% work in hospitals, and 15% work in settings such as the government, colleges, pharmaceutical industry, associations and universities.

In Canada, pharmacists are provincially regulated, which means that the necessities to be fulfilled vary significantly between provinces. Each Canadian province has its own provincial pharmacy regulatory authority equivalent to the state pharmacy councils in India. The process for an International Pharmacy Graduate (IPG) to obtain a license to practice in Canada involves several steps. This process can take several months and sometimes up to two years or more. The time required to complete the licensure process varies according to candidates and is influenced by many factors such as availability of seats, competency and learning ability of candidates The approximate cost of the total licensure process is between 6000-7000$ in most provinces. However, some provinces require candidates to complete a bridging program (especially for repeat test-takers), which can increase the total expense to approximately 15,000-20,000$. This article will provide a brief outline of the various steps that are to be completed by an IPG to become a pharmacist in Canada.

Step 1: Register with Pharmacists' Gateway Canada

The first step in the process to become a licensed Canadian pharmacist is enrolment in the Pharmacists' Gateway Canada (the Gateway) except in the province of Quebec. It provides a unique code (National ID number) that will follow the individual in each stage of licensing process.

The portal gives a guidance to candidates on how to apply and complete the national registration exams and how to register with a provincial regulatory body in Canada.

Step 2: Document Evaluation

After enrolling in the gateway, candidates should register directly with the Pharmacy Examining Board of Canada (PEBC) to apply for Document Evaluation. The PEBC is responsible for setting the qualifying exams for the pharmacy profession across Canada. They scrutinize all candidates (both overseas and home students) to assure that each prospective registrant is academically skilled to practice pharmacy in Canada.

PEBC needs proof that candidate's education and training in pharmacy is equivalent to that of Canadian programs. For the evaluation of educational and professional licensure qualifications, candidates should submit: (i) document evaluation printed application form, (ii) documents to support identity (eg: notarized copy of passport) and (iii) documents to support graduation and licensing (transcript, good standing certificate from the pharmacy council where you are currently licensed and degree certificate).

The minimum academic requirement to apply for document evaluation is the completion of a four-year undergraduate degree in pharmacy (there is no academic score cut-off for eligibility). You do not need pharmacist experience in India or a Canadian degree to be eligible to start the licensure process. Once they receive all of the necessary documents, your file will be considered complete, and a results letter will be emailed to you.

The Document Evaluation results are valid for five years from the date on the results letter, which means that you have five years to successfully pass the Evaluating Examination.

Stage 3: Evaluating Exam
Candidates are eligible to apply for the Evaluating Examination once their documents are favourably evaluated. The assess the following subjects: biomedical sciences (15%), pharmaceutical sciences (25%), pharmacy practice (50%), and behavioural, social and administrative pharmacy sciences (10%). A candidate is permitted three attempts at a PEBC evaluating examination. The exam is 4h 15min long in length and there are 200 questions. The candidates need to score at least 60% in order to be eligible to appear for the qualifying examinations. Examination result, which contains the PEBC ID of all successful candidates are posted on the PEBC website within three weeks of the exam. Based on the data provided by the PEBC, only 47.2% of the first-time test takers pass the evaluating exam.

Stage 4: Qualifying exam (Part I and II)
Those who passed evaluating Examination, can apply for the Qualifying Examination (Parts I and II). All prospective pharmacists (Canadian graduates and IPGs) must pass these exams before qualifying to practice in Canada. The qualifying exam has two parts:

1) **The Qualifying Examination – Part I** is a 4h 30min duration multiple-choice question (MCQ) examination comprising of 200 questions. The questions evaluate your understanding and application of pharmacy knowledge to patient situations. They also evaluate your ability to make decisions and solve problems.
   (Exam blueprint: https://bit.ly/3m1ZDqh)

2) **The Qualifying Examination – Part II** is an "objective structured clinical examination" (OSCE), and is taken on a different day than Part I. The OSCE contains a sequence of "stations" simulating common and/or critical practical situations. These simulations often include interactions with a "Standardized Patient" (SP) or "Standardized Client" (SC) (parent or caregiver) or "Standardized Health Professional" (SHP). A trained examiner, using standardized assessment criteria, will observe and evaluate candidates' interactions and completion of the task.

The primary study materials for the evaluating exam and qualifying exams are latest clinical guideline, Compendium of Therapeutic Choices, Compendium of Pharmaceuticals and Specialties and Compendium of Therapeutics for Minor Ailments. There is no pre-defined pass or fail score for both qualifying exam I and II: the pass mark for the exam will vary depending on the set difficulty level. A criterion-referenced pass/fail standard is established for each Part of the PEBC Qualifying Examination.

Candidates are permitted a maximum of three attempts for each part of the Pharmacist Qualifying Examination. Within three year both parts of the Qualifying Examination must be passed. If the candidate does not complete the procedure within this time period, they should retake and pass the part that has already been completed. When candidates passed both parts of the Qualifying Examination, they will receive PEBC Certificate of Qualification. The PEBC Certificate of Qualification is required for licensure in most Canadian jurisdictions; however, it does not give the right to practice. The data provided on the PEBC website indicates that in comparison to 91% Canadian pharmacy graduates who pass part-I qualifying exam during first-attempt, only 41.1% international first-time test takers pass the exam. Similarly, 47.2% IPG candidates pass part-II qualifying exam during first attempt in contrast to 94.2% pass rate among domestic graduates.

Stage 5: Apply to register as an intern with a provisional pharmacy regulatory authority
A formal application to the selected provisional board of pharmacy requires to be made in order

for pharmacists to gain licensure and be able to practice in a definite province. All the territorial and provincial regulatory authorities require IPGs to take a language proficiency test and achieve the NAPRA language proficiency standards before applying for intern registration.

Each province will have precise requirements, including completion of internship in a licensed pharmacy — much like a preregistration placement. Completing the internship program and assessment as indicated by the PRA guarantees that IPGs will have experience in a pharmacy patient care setting and can encounters the national entry-to-practice competency standards.

Stage 6: Jurisprudence Exam

Pharmacy regulatory authorities require pharmacists to understand Canada's laws regarding pharmacy practice, including dispensing drugs and the ethics of professional practice. As part of the licensing process, candidates must prove their knowledge of Canadian federal and provincial drug and pharmacy practice laws, regulations, and the code of ethics for the province where they are applying for licensure.

Step 7: Registration as a pharmacist

License / registration is the last step in the licensure or registration process. Once PRA confirms that a candidate has effectively completed all of the requirements to be licensed, he/she will be registered with the college as a pharmacist.

Canada is a country with great opportunities for skilled professionals, so individuals will be exposed to a diverse way of practicing pharmacy, develop their skills and add diversity to their resume. It will come with its challenges, but it is definitely a worthwhile experience.

Dr. Abin Chandrakumar, Pharm.D, M.Sc., RPEBC
Data Management Analyst
Data Coordinating Centre,
George & Fay Yee Centre for Healthcare Innovation
University of Manitoba

About Abin Chandrakumar

Abin Chandrakumar is an intern at Shoppers Drug Mart in Winnipeg, Canada. He is also working as a Data Management Analyst (REDCap Administrator) at the George and Fay Yee Centre for Healthcare Innovation at the University of Manitoba. His academic background is in Clinical Pharmacology. He completed Pharm.D from Kerala University of Health Sciences in 2016 and graduated from the University of Manitoba in 2019 with a Master's degree in Pharmacology & Therapeutics. He is a recipient of the prestigious Governor General's Academic Gold Medal, awarded by the Office of the Governor General of Canada to students who achieves the highest academic standing at the graduate level in Canadian Universities. In addition to university-level entrance scholarship and travel awards, he received province-level scholarships such as the Research Manitoba Graduate Studentship and the Women's Health Research Foundation of Canada Graduate Scholarship.

During his Master's and tenure as research assistant and coordinator, his primary area of research was paediatric auto-immune conditions. He has published papers in high-impact journals such as JAMA Paediatrics, International Journal of Epidemiology, Inflammatory Bowel Diseases, Journal of Crohn's and Colitis etc. Also, he has authored an invited editorial in the Canadian Journal of Diabetes.

SPOTLIGHT ON THE NOVEL COVID-19 DNA VACCINE

On March 11, 2020, the World Health Organization declared Coronavirus Disease 2019 (COVID-19) as a pandemic. Ever since various groups have made remarkable advances in developing new vaccines across different platforms in a short period. Advanced vaccine platforms such as nucleic acid vaccines are being extensively researched and India has successfully developed a novel DNA vaccine for COVID-19 wherein the Emergency Use Authorization (EUA) from the Drugs Controller General of India (DCGI) is in process.

Prior studies with the DNA vaccine platform for severe acute respiratory syndrome and Middle East respiratory syndrome have demonstrated induction of effective immune response with neutralizing antibody responses in clinical trials. DNA vaccines can effectively induce both humoral and cell-mediated immune responses.

DNA vaccines encode immunogenic antigens like the spike protein in severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) which is delivered to the host cell using DNA plasmids as a vector that is administered via the intradermal or intramuscular route. Once the vaccine has reached the host cell's nucleus, the mammalian promoter in the vector gets triggered and the process of transcription of the gene of interest is initiated by the host cell's machinery.

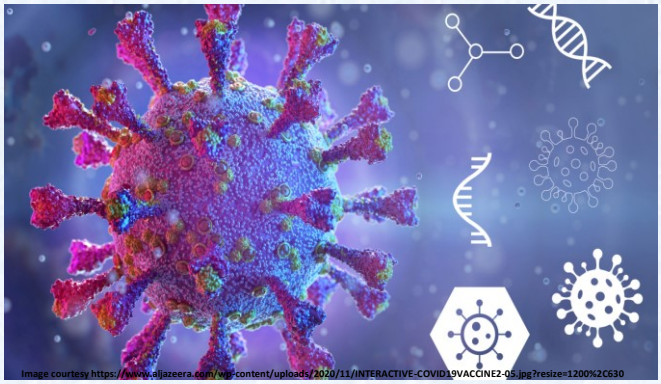

Image courtesy https://www.aljazeera.com/wp-content/uploads/2020/11/INTERACTIVE-COVID19VACCINE2-05.jpg?resize=1200%2C630

As feared by many, the myth that DNA vaccines can alter human DNA has been circulating for quite some time. However, it is important to understand that the gene of interest is NOT integrated into the host cell's DNA. The proteins produced are expressed within the cell and are translocated to the cellular membrane where antigen-presenting cells recognize the antigen. The proteins are processed and neutralizing antibodies are released through the Major Histocompatibility Complex (MHC) class pathway which recognizes SARS-CoV-2 viruses and neutralizes them.

"As feared by many, the myth that DNA vaccines can alter human DNA has been circulating for quite some time. However, it is important to understand that the gene of interest is NOT integrated into the host cell's DNA"

DNA vaccines can be administered by electroporation or high-pressure devices that facilitate the DNA plasmids carrying the antigen to enter the cell. The vaccine being developed in India is administered using a Needle-Free Injection System (NFIS) that favors those who fear needles, eliminates needlestick injuries, reduces needle reuse and cross-contamination.

The advantages of DNA vaccines are:

1) They elicit broad immune responses involving both cellular and humoral immunity
2) Encode different antigens in a single vaccine; effective against COVID-19 variants
3) Efficient large-scale production and low-cost
4) High storage stability and have less need for refrigeration i.e., practical in endemic areas.

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- Silveira, M.M., Moreira, G.M.S.G. and Mendonça, M., 2020. DNA vaccines against COVID-19: Perspectives and challenges. *Life sciences* (267). pp.118919.

- Dey A, Chozhavel Rajanathan TM, Chandra H, Pericherla HPR, Kumar S, Choonia HS, et al., 2021. Immunogenic potential of DNA vaccine candidate, ZyCoV-D against SARS-CoV-2 in animal models. *Vaccine*. 39(30):4108-4116. https://10.1016/j.vaccine.2021.05.098

Ms. Vaishnavi Balraj
Junior Associate Scientific Writer
Indegene

About Ms. Vaishnavi Balraj

Ms. Vaishnavi Balraj is currently working as a Junior Associate Scientific Writer for Indegene where she is involved in developing content that is scientifically accurate across various therapy areas for doctors that are super-specialists. Her main domain of work includes COVID-19, gynecology and vaccines.

Vaishnavi obtained her Master's degree in Pharmacology in 2020 from M S Ramaiah University of Applied Sciences, Faculty of Pharmacy after completing her Bachelor's in Pharmacy from the same university in the year 2018. Her Master's research was focused on the effect of Indian medicines on multiple sclerosis in a suitable animal model.

FATHER OF INDIAN PHARMACY

Prof. Mahadeva Lal Schroff, rightly called as the Father of Pharmacy Education in India, departed this mortal world on August 25, 1971, and he certainly remains an idol to all pharmacists working in this country irrespective of their branches and diversity of duties.

Prof. Schroff, although not being trained as a pharmacist, gave the right direction not only to pharmaceutical education but also to the industry as well in India with his inclination, understanding, capacity and broad vision.

Born on March 6, 1902 at Darbhanga in Bihar, Schroff had his schooling from Bhagalpur and passed the Intermediate Examination in 1920. He joined Engineering College Banaras Hindu University for his studies and was inspired by the talk delivered by Swamy Satya Deo at BHU in 1921.

Encouraged by the call given by the Mahatma Gandhi, Prof. Schroff raised voice against principal Charles A King. Later, Prof. Schroff left India and stayed in China and also 15-16 months in Japan, during which he worked with a newspaper and succeeded in collecting a good amount and then proceeded to America for his higher studies.

In 1922, he enrolled for his B.Sc at Chemical Engineering Course at Lowa and earned the coveted scholarship. However, soon he left the institution and joined Cornell University and got his degree in Arts with honours in Chemistry, in 1925. Further, he obtained his MS in Chemistry and Microbiology from Massachusetts Institute of Technology (MIT) in 1927.

After returning to India in 1929, he took up a job with Birla Brothers Ltd. Due to his unhappiness with the trade and self-interest of the society, He momentarily thought of going back to the United States. However, the meeting with Jamnalal Bajaj transformed his attitude towards patriotism for his country and involved himself in the movement for freedom. With the pursuance of J. L. Bajaj he was introduced to the then Vice Chancellor of BHU. Pt. Madan Mohan Malviyaji, who spotted the spirit of education in his eyes and he was invited to join BHU as a staff in an honorary capacity.

"In 1937 Full-fledged three-year B Pharm course was started at BHU for the first time in India"

In 1932, at BHU, Prof. Schroff, with his chemical technology background urged Pt. M.M. Malviyaji to start a separate branch (section) of Pharmaceutical Sciences at BHU. Pt. Malaviyaji realized its importance and Schroff was given the green signal to organise this new discipline in India, for the first time.

Prof. Schroff introduced Pharmaceutical Chemistry as the principal Subject in the B.Sc. course in 1932 in BHU. From 1934 an integrated 2-year B.Sc. Course with the subjects - Pharma chemistry, Pharmacy and Pharmacognosy, was introduced, which later from 1937 was turned into a full-fledged three-year B Pharm course at BHU for the first time in India. This was the first and the foremost creation of Prof. Schroff, which earned him the title of the pioneer and Father of Indian Pharmaceutical Education.

Soon, Prof. Schroff - in December 1935 - started United Provinces Pharma Association, which soon crossed the borders of UP in 1939 and took the shape of Indian Pharmaceutical Association in 1939 with branches all over the country. He himself edited the Indian Journal of Pharmacy, founded in January 1939.

Prof. Schroff very carefully earned the confidence, love and affection of the top intellectuals, scientists and industrialists, doyens of chemistry, technology, pharmacology and medical practitioners, and successfully created the awareness of this science for the development of pharmaceutical education of science and technology in India.

Pt. I. N. Gurtu (ProVC) and Prof. M. L. Schroff (sitting 1st and 2nd from left) at Prof. Schroff's Farewell from Department of Pharmaceutics, BHU (1943)

Prof. Schroff started the M.Pharm Education in 1940 at BHU with his efforts. Slowly the pharmacy education sprung up in different places in India. He left BHU in 1943 and joined Birla Brothers as their Chief Chemist and Research Officer and served as Secretary to the Birla Laboratories till 1949 at Calcutta. But the teacher within him made him restless and he was given the position and responsibility as principal at Birla College, Pilani, where for the next five years he organized Pharmacy education at intermediate and degree level successfully. His skill in journalism flourished when he started his own periodical "**Indian Pharmacist**".

References:

https://www.pharmdinfo.com/pharma-newsf11/topic1426.html

https://www.old.iitbhu.ac.in/phe/pharmsociety/issue_2003-2004/2.Mahadevlal_Schroff.pdf

Image Courtesy: https://www.wallpaperflare.com/webinar-digital-wallpaper-education-training-learn-seminar-wallpaper-ulfkd

TRANSLATIONAL PHARMACY : INDIAN PRACTICE PERSPECTIVE

Resource Person

Dr. Shanish Antony

Assistant Professor
Department of Pharmaceutical Sciences,
Government Medical College
Kottayam, Kerala

Department of Pharmacology, FPH, hosted a webinar entitled "Translational pharmacy: Indian practice perspective" on 5th - March - 2021

Dr. Shanish Antony has completed his M. Pharm and Ph.D in Pharmacology from The Tamil Nadu Dr. M.G.R. Medical University and JSS University, Mysore, respectively. He has sixteen years of teaching experience with two books authored and 35 scientific Journal publications to his credits. He has supervised more than 30 postgraduate students in Pharmacology discipline.

Recorded Webinar can be accessed using following link
https://youtu.be/-H3mWsWnfg4

About Webinar

Indian pharmacy practice services are still in dormancy, despite 73 years ahead of Pharmacy Act implementation in the country. The poor socio-economic status, medical hierarchy monopoly and social stigma adhering to the ancient allopathic systems are major barriers for poor pharmaceutical care services and its development in India compared to western countries. Pharmacy Council of India laid down its standards and job conditions for practicing pharmacists in 2015 and its amendments recently in June, 2021. This webinar emphasizes on the need for understanding the professional role of practicing pharmacist in the community-based, so called "Pharmacy Clinics or Pharmacy Care Centres".

UPCOMING EVENT

ALTERNATIVES TO ANIMAL EXPERIMENTATION - 5R CONCEPT

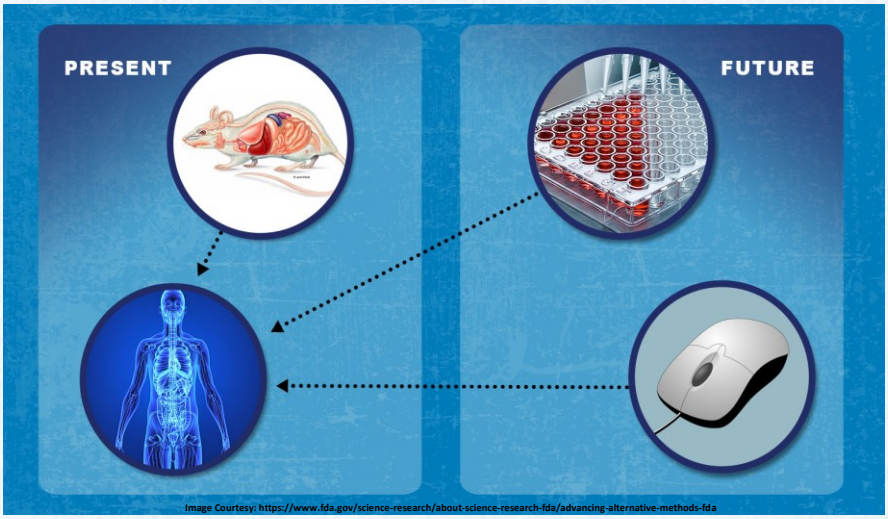
Resource Person

Dr. S Kavimani

Professor & Head

Department of Pharmacology

Mother Theresa Post Graduate & Research Institute of Health Sciences, Puducherry



About Webinar

About 50-100 million animals ranging from zebra fish to non-human primates are used for experimentation every year. The distress, pain and death to the animals during experimentation have always been a debating issue and major concern of ethics. Animal experimentation in biomedical research continue to remain crucial to find better ways to understand the course of human diseases further for prevention and treatment. This webinar emphasizes on the use of alternative models and adaptation of 5R' principles in order to significantly reduce the animal use, development costs, optimizing the drug development process.

Convener

Dr. J. Anbu

HOD(I/C)

Event Co-Ordinator

Damodar Nayak A

Assistant Professor

Date: 28/Aug/2021

Time: 10:30 AM – 12:30 PM IST

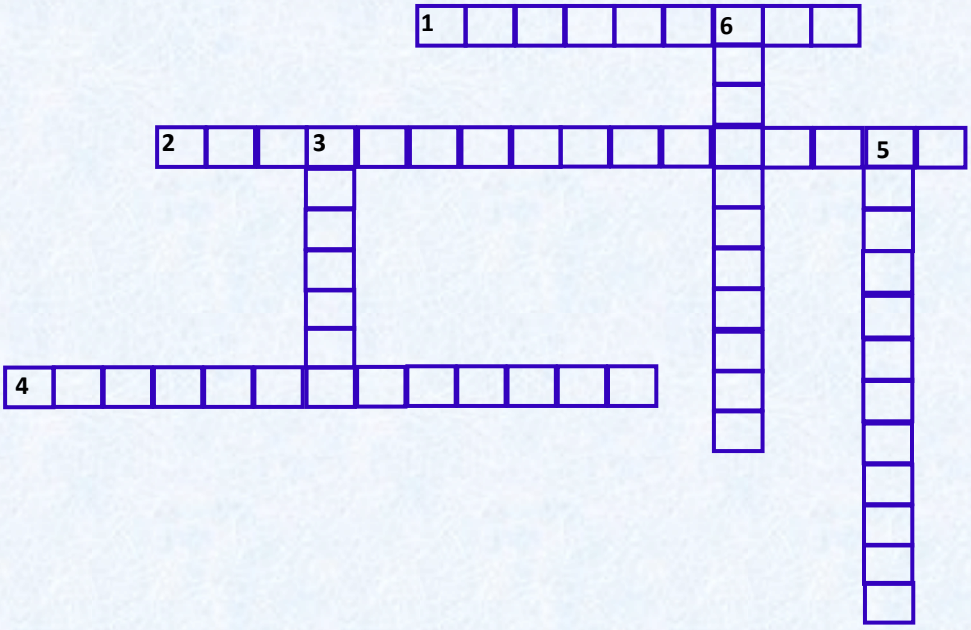
Registration Link:

Microsoft Teams

Mind Lab

Win Exciting Gifts !!!

Solve the Crossword



Across

1. The practice of exploiting naturally occurring genetic or biochemical material in commerce.

2. A rare, slow-growing type of soft tissue cancer

4. I'm venom and I catalyse the coagulation of the blood.

Down

3. Vaccine that prevent tick-borne encephalitis

5. I'm a Novel candidate for Covid, I stop replication by incorporating RNA-like building blocks into the RNA genome of the virus

6. I'm approved recently to help prevent nausea and vomiting after surgery

Terms and conditions

- Mind lab – III consists of **Two** segments, Solved answers to be mailed to fphpanpharmacon@gmail.com on or before **15-September-2021**
- Its 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	A	C	A	B	A	P	N	A	M
B	P	Z	P	B	P	M	C	C	E	D	C	I
A	B	I	N	I	T	I	R	P	A	V	A	T
P	R	M	N	H	N	P	B	I	T	E	Z	O
T	E	E	M	P	M	C	V	V	M	I	Z	M
A	M	A	M	M	H	L	E	I	B	H	E	Y
Z	D	I	B	L	O	A	P	R	V	S	P	C
V	E	S	E	J	B	D	E	M	I	I	E	I
E	S	E	O	H	I	L	Z	M	R	V	T	N
R	I	D	T	A	Z	E	Z	P	A	O	P	V
G	A	S	T	R	O	P	A	R	E	S	I	S
K	I	A	C	A	B	H	T	A	C	N	O	R
R	R	T	A	Z	V	S	O	P	M	H	R	N

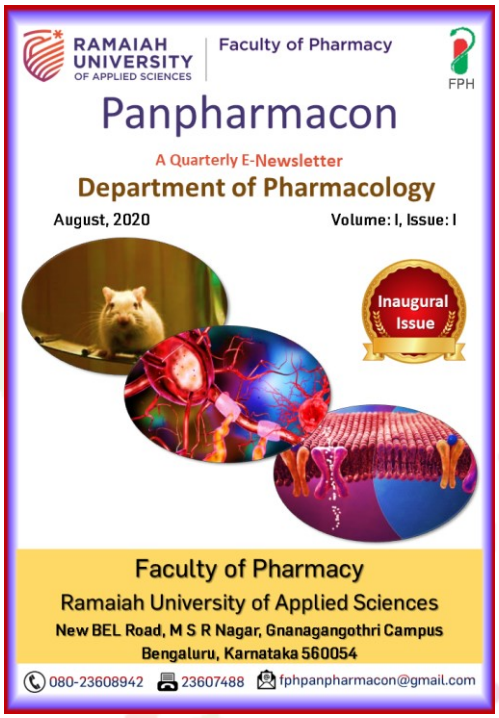
Mitomycin, Avapritinib, , Dojolvi, Gastroparesis, Tepezza

Winner – Mind Lab II

Maya S Pai K

Manipal College of Pharmaceutical Sciences, Manipal Academy of Higher Education (MAHE), Manipal

JOURNEY OF PANPHARMACON



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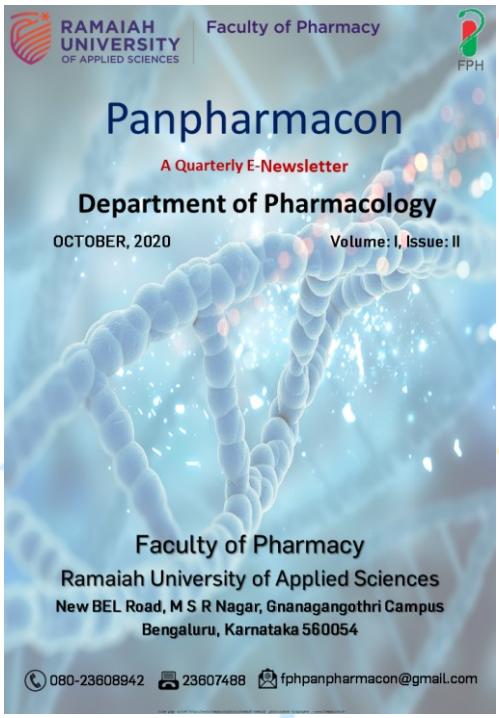

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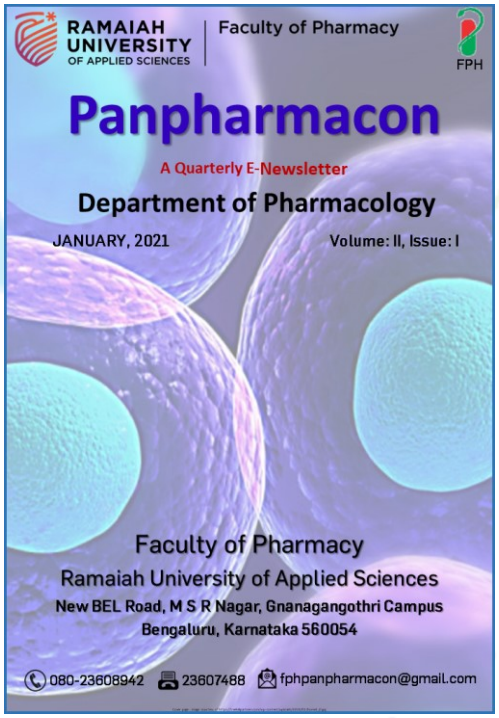

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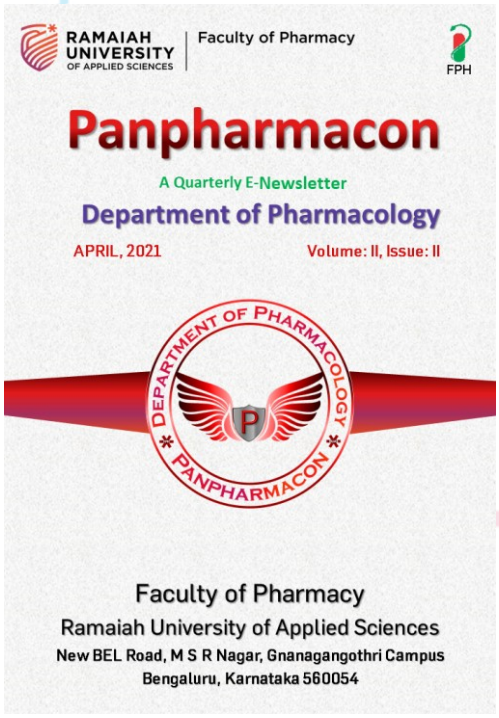

Panpharmacon Vol II Issue II

ACHIEVEMENTS & RECENT RESEARCH PUBLICATIONS

AWARDS

- **Ms. Gouri Nair r**eceived scholarship to attend and present Research work entitled "Identification of therapeutic potential of Ginsenosides against the Autism Spectrum Disorder by Bioinformatics interlaced with *in-silico* techniques" during the 13th Asian Conference on Pharmacoepidemiology, Seoul, South Korea

- **Ms. Hajira Banu H**, received a Travel fellowship for presenting a research paper entitled "Brain-targeted intranasal formulation of *Centella asiatica* – A potential strategy for treating Alzheimer's Disease" at the Alzheimer's Association International Conference® (AAIC®), July 2021, at Denver, USA

- **Ms. Anusha Saraswati** received best E-Poster award for the work entitled "Preparation, characterization and *in vitro* cell viability assay of ginsenoside rg1 formulation" in Annual conference of Society for the Study of Xenobiotics "**SSX 2021**"

- Award of Indian Patent to Dr. Sindhu Abraham, V. V. N. R Sirisha, S. Shrinivasan, **Dr Mohammad Azamthulla**, Chethana R **- "A Nano Calcium Based In-situ Gel For Wound Healing And Burns" Patent Grant No. 365983**

PUBLICATIONS

- Pungsh Tadar, Manikanta Murahari, **Mohammad Azamthulla**., (2021) **A Review on Palonosetron - A Potent 5-HT3 Receptor Antagonist and Its Therapeutic Uses**, *International Journal of Modern, Pharmaceutical Research*, 5(4), pp: 30-38

- Sai, M. V. S., Viswam, S., Gns, H., Saraswathy, G. R., and **Nair, G.,** (2021) Prediction of Potential Targets of an Emerging Zoonotic Paramyxovirus: Prediction of Potential Targets of an Emerging Zoonotic Paramyxovirus: An Integrated Bioinformatic Analysis, *Current Pharmacogenomics and Personalized Medicine.* https://doi.org/10.2174/1875692118666210315150037

- Maideen N.M.P, Balasubramanian.R, **J. Anbu**, S. Kavimani, Manavalan.G And Mohamed Rafiullah., (2021) Therapeutic Efficacy Of Kabasura Kudineer (Siddha Formulation), In Covid-19 – A Review of Clinical And Molecular Docking Studies, *Asian Journal of Advanced Research*

- **Haroon HB**, Ahmed N, Sampath MK, Dinesh S, Azamthulla M, Radhakrishnan G, Govindappa S. (2021) *Tamarindus indica.* Linn leaves ameliorates experimental induced heart failure in Wistar rats. *Journal of Basic and Clinical Physiology and Pharmacology*. https://pubmed.ncbi.nlm.nih.gov/33915613/

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Editor-in-Chief
Panpharmacon
fphpanpharmacon@gmail.com
Department of Pharmacology
Faculty of Pharmacy, RUAS
080-23608942, 9480641225