RAMAIAH UNIVERSITY OF APPLIED SCIENCES | Faculty of Pharmacy

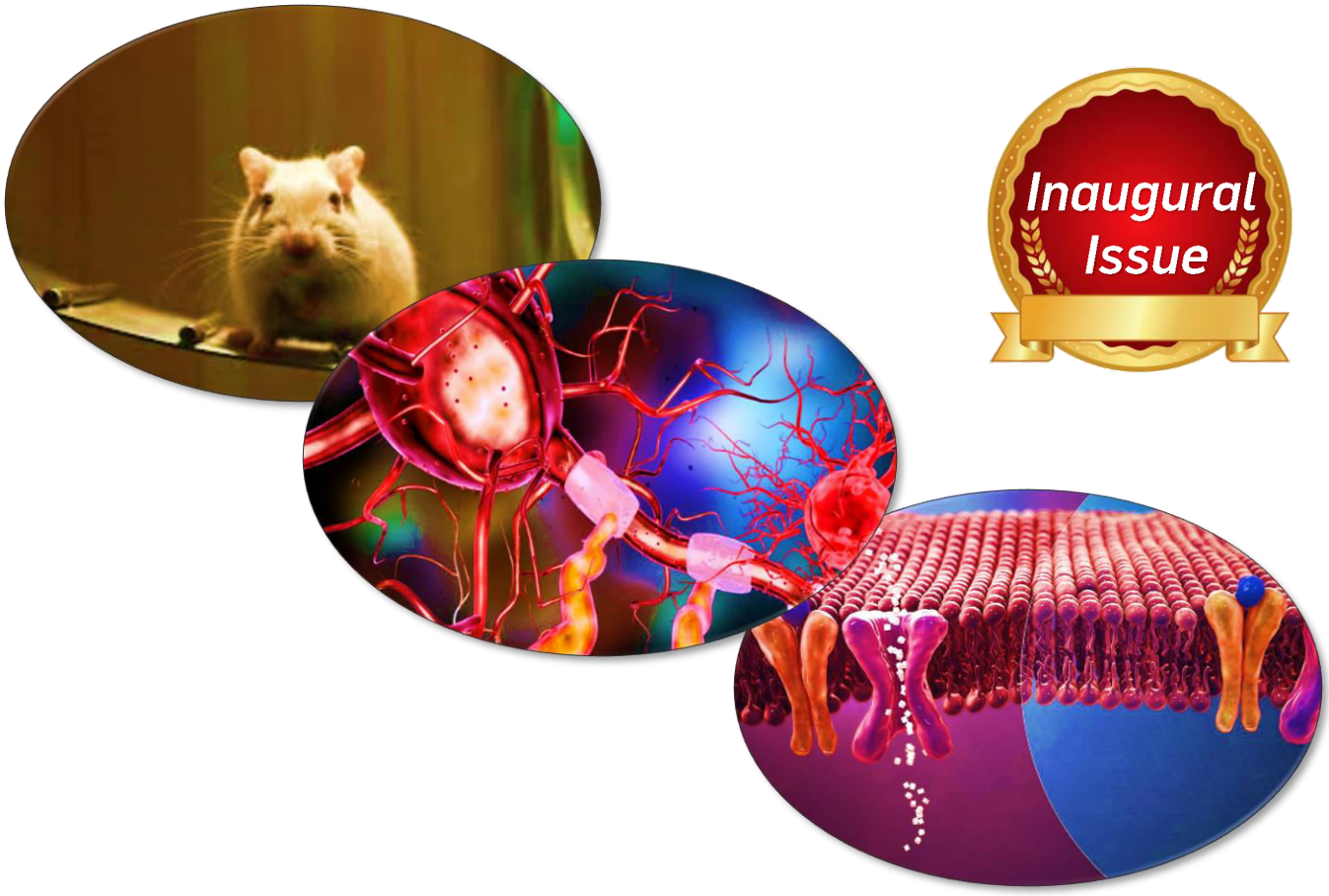
FPH

Panpharmacon

A Quarterly E-Newsletter

Department of Pharmacology

August, 2020 Volume: I, Issue: I



Inaugural Issue

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Contents

Note from Chairman's Desk

"Let us tenderly and kindly cherish, therefore, the means of knowledge. Let us dare to read, think, speak, and write". - John Adams

It is my great pleasure to extend heartfelt greetings to the readers of first issue of the E-Newsletter Panpharmacon from Department of Pharmacology, Faculty of Pharmacy, RUAS. Department of Pharmacology is one of the foundation departments of the Faculty of Pharmacy, dedicated to the training of undergraduate, postgraduate pharmacy and doctoral students. We at Faculty of Pharmacy aim to prepare the young pharmacists and researchers to competently face the challenges in the career by imparting high quality education and serve the local and regional pharmaceutical sectors through providing well – qualified and trained professionals. I believe that this newsletter will serve as a window through which the complete profile of the academic and research activities, achievements and improvement of the department made during the stipulated period can be regarded. Having said that, I would like to congratulate all the members for their contribution to 'Panpharmacon' and I look forward for this to continue in the future.

Best wishes for the success of "Panpharmacon".

Dr. V. Madhavan

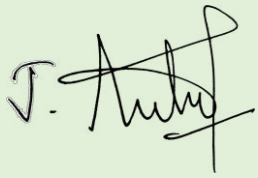
Chairman-Panpharmacon and Dean

Faculty of Pharmacy, RUAS

Editor's Note

It is my privilege to introduce the inaugural issue of the quarterly E – Newsletter "Panpharmacon" from Department of Pharmacology, Faculty of Pharmacy, RUAS. I would like to sincerely thank our Hon'ble Vice Chancellor Dr. Sivaguru S Sritharan for his exceptional motivation in release of this E – Newsletter. I would also like to express my gratitude to Dr. Sundaresh D.C. Pro-Vice Chancellor, Health Sciences for his timely support and advise. I am grateful to Dr. V. Madhavan, Dean, Faculty of Pharmacy and Chairman, Panpharmacon for the constant encouragement and support in the release of this E – Newsletter .

The vision of Department of Pharmacology is to become a top-ranked research-academic centre in the Pharmacology and Toxicology discipline in India that will be responsible for leadership in Pharmacology education, training, research, development and related services. The department has developed its infrastructure that includes E-learning, physiology and pharmacology laboratory as well as established research team to cater the need of students and researchers. The primary task of the Panpharmacon team has been to publish and maintain the RUAS standards on education as well as research. Therefore, the committee has decided to issue this E – Newsletter in order to spread word of our activities quarterly. Panpharmacon will strive hard to attract and engage a national readership where academic institutions and researchers are the primary target group. Any criticism, opinions, and encouragement will be highly appreciated by the readers of the Newsletter.



Dr. J. Anbu

Editor-Panpharmacon

Editor-in-Chief Note

I am delighted to bring you this quarterly E – Newsletter - Panpharmacon, the inaugural issue from Department of Pharmacology, Faculty of Pharmacy, RUAS. Assuming my new role, it is appropriate for me, as the Editor-in-Chief, to share with you some thoughts about the role and vision of Panpharmacon. Taking part in Panpharmacon would be a great opportunity to discuss some of the recent developments and new information related to Pharmaceutical Sciences emphasizing Pharmacology. Panpharmacon is served by a very skilled enthusiastic Editorial Board along with a network of eminent researchers from all around the nation helping to secure standards and originality.

We strongly believe that Panpharmacon will provide the primary forum for advancement and dissemination of scientific knowledge on Pharma Education and Research. It will include up-to-date, high-quality, and original information from reputed journals and magazines as well as recently published books. Panpharmacon therefore encourages contributions that make extensive use of variety of methodological approaches. The team invites the scientific information focused on but not limited to recently introduced drugs in the market and new methods/ techniques developed for screening of drugs and recent inventions in molecular pharmacology. For any queries, suggestions or feedback please do not hesitate to contact our team via fphpanpharmacon@gmail.com

Best wishes and thank you in advance for your support and contribution to Panpharmacon!

Mrs. Sathiya. R, M. Pharm., (Ph.D)

Editor-in-Chief, Panpharmacon

Department of Pharmacology

Department of Pharmacology is one of the foundation departments of Faculty of Pharmacy, dedicated to the training of undergraduate, postgraduate pharmacy and doctoral students. The postgraduate program of the department was started in 2013 with intake of 15 students. The vision of the department is to become a top-ranked research and academic centre in the Pharmacology and Toxicology discipline in India that will be responsible for leadership in Pharmacology education, training, research, development and related services with the mission to contribute in the overall training of students, through enriching with the knowledge, attitude and skills needed to fit effectively and efficiently into both national and international arena. Department of Pharmacology is involved in various *in vitro* and *in vivo* research projects that expertise in the area of toxicological research, neuropharmacology, molecular pharmacology and cardiovascular pharmacology.

Key Features of the Department

- The Department of Pharmacology is well known for its research activities and its well-maintained animal house is approved by central government body CPCSEA
- The Department has well-qualified, experienced faculty with dedicated vision of research
- The laboratories at Department of Pharmacology are well equipped with instrumentation facilities including modern teaching techniques with computer assisted learning, library, audio-visual aids and other resources with all safety measures

- The laboratories provide facilities for the students to carry out all types of basic pharmacological *in vivo* and *in vitro* screening activities with computer simulated exercises
- The Department provides Hands-on experience on animal research with guidance from experienced faculty, technical skills and theoretical aspects of pharmacology individually
- Department provides an opportunity to students to interact with industry professionals through workshops, symposiums and seminars conducted in collaboration with pharmaceutical industries
- Keeping fit of postgraduates to make them competent in academics, research and industry with 100% placement support
- The department has legal Memorandum of Understanding with the reputed pharmaceutical industries to support our research scholars in performing advanced experiments and also understand the industrial climate

Acknowledgment

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 Chancellor for patronage and advising us on the importance of enhancing the visibility of workplace that stimulated us to come out with informative Panpharmacon E – Newsletter. We also thank all our well wishers and friends for supporting us in making this useful article.

Coronavirus Anxiety Scale (CAS) – A Brief Mental Health Screener

The COVID-19 pandemic has affected our life in every single way possible right from day-to-day life living, work, shopping, socializing or planning for the future. Although the number of patients affected or mortality rate has been well documented by media, the actual psychological impacts or mental health care needs are relatively being neglected. Pandemic related anxiety is predicted to show an elevation in the post-traumatic stress, general anxiety, stress and suicidality as it happened with the previous disease outbreaks. The Corona Virus Anxiety Scale developed by Lee *et al.,* (2020) could help identify those particularly affected by the fear and uncertainty of this growing pandemic crisis. Using mental health screeners, like the CAS, to identify and treat these people with appropriate mental health services before they overwhelm emergency response and medical facilities, is an important step toward combating the COVID-19 pandemic.

The CAS is reported to exhibit good diagnostic properties and with an optimized cut score of ≥9, it has been able to accurately distinguish between persons with and without dysfunctional anxiety. Each item is rated on a 5-point scale to reflect the frequency of the symptom, ranging from 0 (not at all) to 4 (nearly every day) over the preceding two weeks.

Coronavirus Anxiety Scale (Lee *et al.*, 2020)

How often have you experienced the following activities over the last 2 weeks?		Not at all	Rare, less than a day or two	Several days	More than 7 days	Nearly every day over the last 2 weeks
1.	I felt dizzy, lightheaded, or faint, when I read or listened to news about the coronavirus.	0	1	2	3	4
2.	I had trouble falling or staying asleep because I was thinking about the coronavirus.	0	1	2	3	4
3.	I felt paralyzed or frozen when I thought about or was exposed to information about the coronavirus.	0	1	2	3	4

4.	I lost interest in eating when I thought about or was exposed to information about the coronavirus.	0	1	2	3	4
5.	I felt nauseous or had stomach problems when I thought about or was exposed to information about the coronavirus.	0	1	2	3	4
	Column Totals	**±**	**±**	**±**	**±**	**±**
				Total Score _____		

This scaling format is based on the DSM-5's (The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition) cross-cutting symptom measure consistent with the American Psychiatric Association's system, adult self-rated version including the following parameters.

Dizziness is major symptom of generalized anxiety disorder (GAD) and panic attacks. Sleep disturbance is a common symptom of both GAD and post-traumatic stress disorder. Tonic immobility is not a major symptom of any psychiatric condition but an involuntary response to extreme fear and captivity.

Appetite loss is a common symptom of major depressive disorder, a condition that often co-occurs with panic disorder, fear and imminent threat. Nausea or abdominal distress captures the digestive changes associated with a fear response. Similar to dizziness, nausea and abdominal distress are also major symptoms of panic attacks and are associated features of generalized anxiety disorder.

Limitations

1) The use of single-item scales could reduce validity of the psychological, attitudinal, and coping constructs measured in this study

2) The results of this study may be an underestimate of the psychological impact of the COVID-19 pandemic because it was designed in the US during the beginning stages of the crisis, before Americans experienced massive school and work closures

3) The rating of “2” as the item response for the all the questions indicates inappropriate answers from participants (In the original study, this item was imbedded into the questionnaire for the purpose of eliminating participants who may threaten the integrity of the study’s results by not appropriately attending to the questionnaire’s content)

4) Elevated score can be associated with various factors such as corona virus diagnosis, corona virus fear, disability, coping, hopelessness, and suicidal ideation, social attitudes, which needs a careful interpretation of the cause.

Mrs. Sathiya. R
Assistant Professor
Department of Pharmacology

Reference:

Lee, S.A., Mathis, A.A., Jobe, M.C., and Pappalardo E.A. (2020). Clinically significant fear and anxiety of COVID-19: A psychometric examination of the Coronavirus Anxiety Scale. *Psychiatry Research*, 290, pp. 113112

Photoswitches – A New Paradigm in Pharmacology

Light, a part of our daily lives is often unrecognized for its importance. It has an intertwined past with medicine. Be it the use of Heliotherapy, an important part of athletic training to improve muscle health or use of sunbath to maintain good health. For decades, many researchers have extensively used light to wield control. For example, in chemistry, light is used to hasten reactions and to make new molecules and in biology, light can influence cells and even the behaviour of animals.

Recently, Prof. Dirk Trauner and his team developed an innovative approach to activate or deactivate therapeutics or biological processes with the aid of light. It involved the use of chemistry to design drug molecules that change their shape and activity with the flick of a light switch hence called "photoswitches". The knowledge of photoswitches (photopharmacology) could not just help target therapies to particular parts of the body but also limits side effects.

Azobenzene as 'photoswitch' and Restoring sight

The very first molecule identified to be used as photoswitch was Azobenzene (two benzene rings linked by nitrogen – nitrogen double bonds). On irradiation with UV light, the more stable trans isomer would switch to *cis* conformation, and with time, molecule reverts to the more stable '*trans*' form. Related to this, researchers developed a light-responsive drug that could restore sight.

Opsins are light-sensitive receptor proteins in eyes that are essentially in-built photoswitches that work together with the light-sensitive retinal.

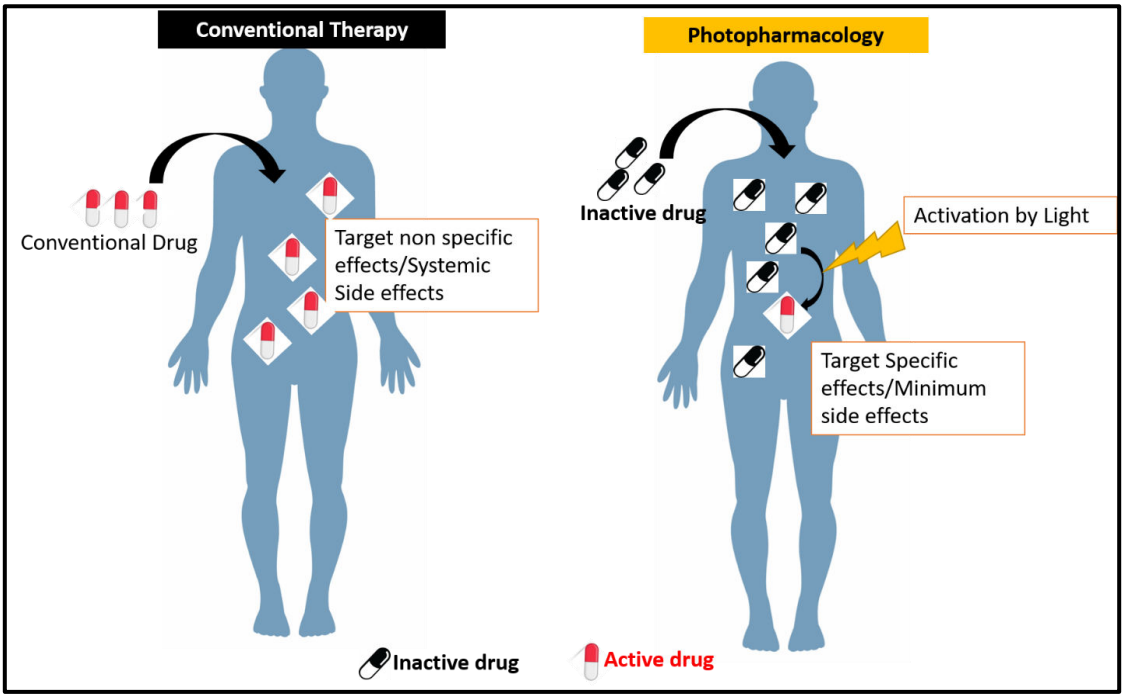
Photoisomerisation of retinal by a photon of light induces a conformational change in the opsin protein, causing a cascade of cell signaling that results in an electrical signal being sent to the brain. With this background, Trauner and team tried to replace the function of opsins (irreversibly degenerated in blindness) using a drug containing a switchable azobenzene molecule. The idea was to set forth a signalling cascade similar to the signals when photoreceptor proteins are working.

The first successful candidate developed was the molecule diethylamine-azobenzene-quaternary ammonium (DENAQ), which imitates the light switching function of opsins, when activated by light. DENAQ successfully restored light sensitivity in blind mice that was evident by increased levels of movement and learning abilities. Though it is said that, restoring some light sensitivity in mice is a long way from restoring meaningful sight in humans, but these findings are hopeful for restoring sight in the future through the principle of photopharmacology.

Photoswitches in Chemotherapy

In 2016 most recent breakthrough, was the synthesis of a photoswitchable chemotherapy drug based on combretastatin A-4 (CA4), a compound discovered 20 years for its ability to stop cell division by inhibiting the production of microtubules.

However, these chemotherapeutics inhibiting microtubules are also associated with severe side effects due to their non-selectiveness, which can limit dosages.



Hence, with the help of photopharmacology, these classes of drugs were modified to hit the only microtubule when irradiated. These new molecules were named 'photosatins' whose drug activity was controlled by blue light. The light causes a switch to the *cis* conformation, which is 250 times more toxic to cancer cells than the *trans* isomer. Photostatins were able to achieve targeted single-cell death, with neighboring untargeted cells continuing to divide unharmed. This approach was considered to be an ideal treatment for skin cancers, but the use of therapy for tumours inside the body is still questionable as delivering light (without harmful effect) inside the body is the ultimate challenge.

Therefore, to conclude, the knowledge of photopharmacology can be applied for the development of precision medicine. The activation or deactivation and dosage of the drug could be altered within the body gradually as long as light-delivery is possible. New technologies for light delivery in human are emerging, largely driven by optogenetics and photodynamic therapy all of which are making photopharmacology a promising new domain in science.

Ms. Hajira Banu H
Assistant Professor
Department of Pharmacology

References:

Sarma, P., & Medhi, B. (2017). Photopharmacology. *Indian J Pharmacol*, 49 (3), pp.221–222.

Velema, W. A., Szymanski, W., and Feringa, B. L., (2014). Photopharmacology: beyond proof of principle. *J. Am. Chem. Soc*., 136, pp.2178–2191.

Hüll, K., Morstein, J., and Trauner, D. (2018). In Vivo Photopharmacology. *Chem Rev*. 118(21),:pp.10710-10747.

Stem cell therapy for Osteoporosis

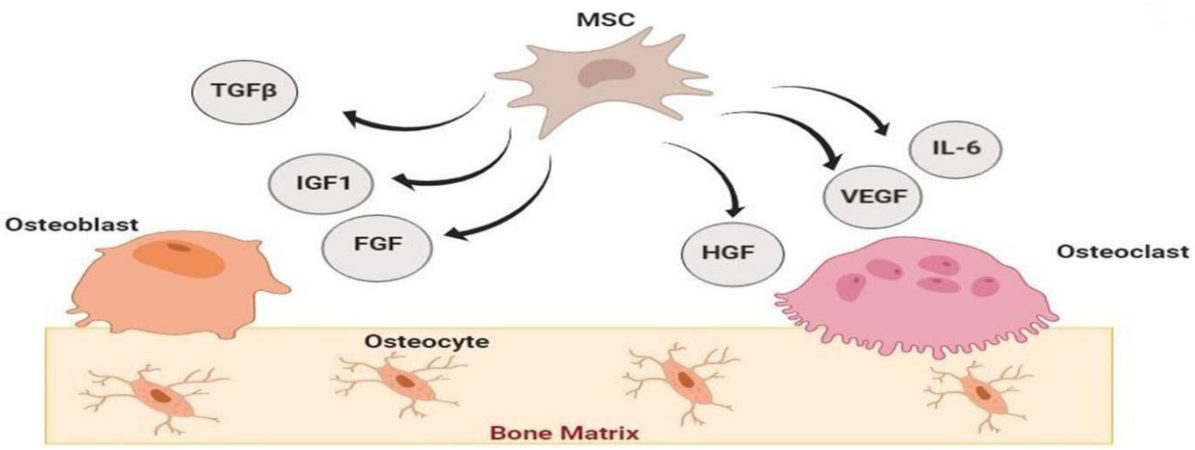
Osteoporosis is a metabolic skeletal disease characterized by low mineral density and micro-architectural deterioration of the bone tissue which results in increased bone fragility and susceptibility to fracture. The usage of stem cells for regeneration of the tissue has enhanced hope in the field of medicine and musculo-skeletal disorders. The field of cell therapy and regenerative medicine can hold the promise of restoring normal tissues structure and function.

Stem cell-based therapy is considered as a new approach to regenerate the bone tissue. The Mesenchymal Stem Cells' (MSCs) effectiveness majorly depends on their secretary function. Osteogenesis and bone remodelling are complex processes that involve multiple mechanisms and interactions between distinct cells. Osteoblast generation is the most important mechanism since osteoid secretion by osteoblasts is the main procedure for generating bone tissue. A population of self-renewing and multi-potent human Skeletal Stem Cells (SSCs) generates progenitors of bone, cartilage and stroma but not fat. These SSCs reside in the postnatal bone marrow and are implicated in skeletal physiology.

The term Mesenchymal Stem Cells (MSCs) has been used for years to characterize a multipotent stromal cell population that can differentiate into a variety of cell types; including osteoblasts (bone cells) and chondrocytes (cartilage cells).

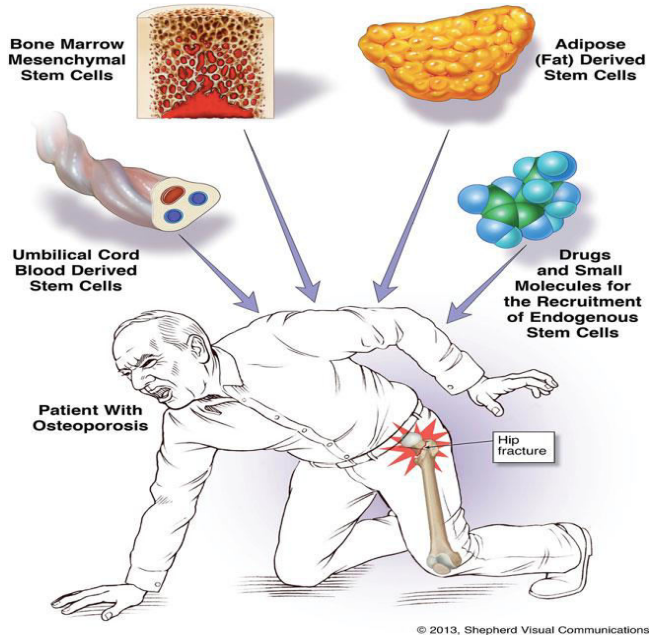
The bone tissue homeostasis under physiological condition is maintained due to the osteogenetic and adipogenetic abilities of the MSCs.

Cell-based regenerative medicines can increase the number of progenitor stem cells and improve the function of stem cells. Since the bone tissue repair cascade can be controlled by local signals from various cytokines and growth factors through the inducing osteoprogenitor cells migration, differentiation, proliferation, revascularization and extracellular matrix production stem cells (especially MSCs).It can support bone regeneration by secreting bioactive molecules such as IGF-1, TGF-β, vascular endothelial growth factor (VEGF), angiogenin, hepatocyte growth factor (HGF), IL-6, and etc. On the other hand, MSCs derived exosomes are other factors with their effects on preventing the bone loss and promoting bone remodelling processes.



Paracrine effect of MSC in bone regeneration

The stem cell therapy reduces the susceptibility of fractures and increase vanished mineral density by either rising the number or restoring function of local stem cells that can multiply and differentiate into bone forming cells. This therapy can be done by exogenous introduction of MSCs which can be obtained from bone marrow, umbilical cord and adipose tissue or via drugs which recruit endogenous stem cells to osteoporotic sites.



Stem cells to treat osteoporosis

In terms of stem cell source, Embryonic Stem Cells (ESCs) and induced Pluripotent Stem Cells (iPSCs) have seen very limited use for the treatment of skeletal disorders. This is mostly due to the fact that these cell types do not easily differentiate into the osteogenic lineage. Furthermore, the ethical and safety issues surrounding ESCs and iPSCs.

Future advancements in stem cell therapy for osteoporosis would probably entail the use of other sources of stem cells that are yet to gain widespread exposure. For example, stem cells derived from dental pulp and exfoliated teeth have gained recent interest for bone tissue applications due to their easy availability and strong osteogenic capacity. Currently, MSCs are the most widely used stem cells for osteoporosis research due to their intrinsic ability to differentiate into osteoblasts; the ease of procurement and the capacity to genetically manipulates them for *in vivo* applications.

Dr. Kesha M Desai
Assistant Professor
Department of Pharmacology

References:

Aghebati-Maleki L., Dolati S., Zandi R., Fotouhi A., Ahmadi M., Aghebati A., (2019). Prospect of mesenchymal stem cells in therapy of osteoporosis: A review. J Cell Physiol, 234(6), pp. 8570-8578.

Babak A., Masoumeh S., Sepideh A.,Moloud P.,Parisa G.,Kambiz G., et al. (2020) Prospect of Stem Cell Therapy and Regenerative Medicine in Osteoporosis. Front in Endocrinol; 1(430), pp. 1-9.

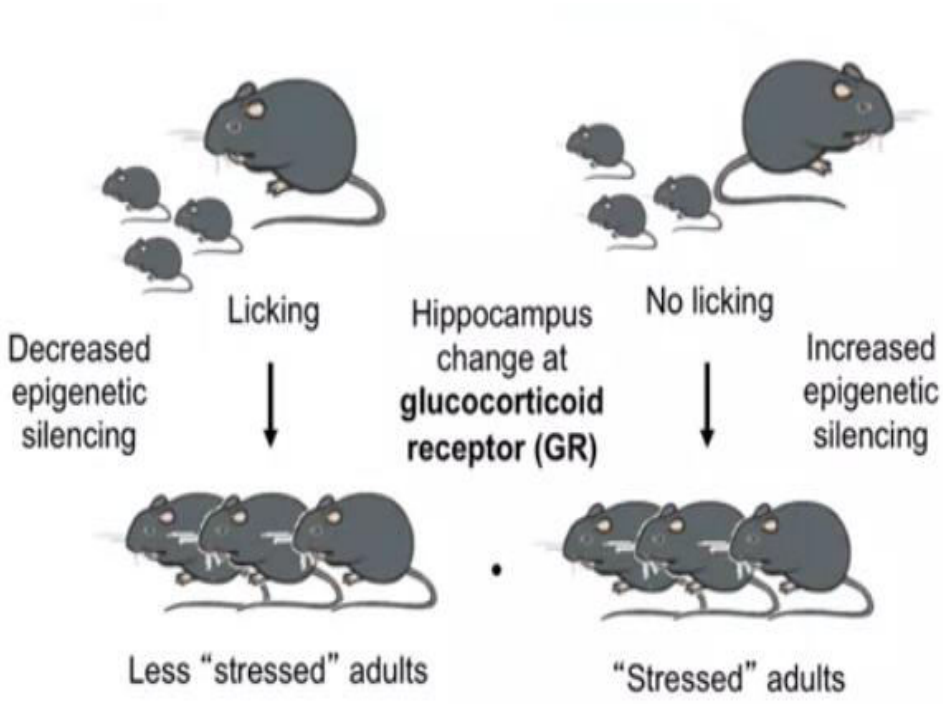
Environment and Transgenerational Epigenetic Inheritance

Did you know male and female turtles are genetically identical, then, how are they differentiated? Well, it is determined by the temperature at which the eggs are incubated. Does this mean the environment influences the gene expression? Yes, Chemical exposure, diet, and changes to mothering style during sensitive periods (Period of primordial germ cell development, pre-implantation period, and early post-implantation period) of development influence the epigenetics of an organism. Epigenetic modifications like DNA methylation and histone deacetylation can alter DNA accessibility and chromatin structure which regulate gene expression. The Agouti mouse model is considered to be a perfect animal model to explain the influence of diet in epigenetic modification.

Agouti viable yellow (Avy) gene carrying mouse is obese and yellow. Interestingly Avy mouse fed with a maternal diet rich in methyl donor (vitamin B12/folic acid) gives birth to thin and brown pups. Nutrients present in the maternal diet causes methylation of agouti locus leads to gene silencing without effecting gene sequence. While the offspring of Avy animals not fed with methyl donating diet remains unhealthy from generation to generation.

Another interesting example of epigenetic alteration is explained through the “rat maternal behavior” study. At birth, the glucocorticoid receptor (GR) gene is highly methylated and inactive.

It was found that pups licked (caring) by mother rats grew up to be calm and more relaxed in stress response because of the demethylation of GR genes. Contrarily, GR genes are not expressed in pups not licked (ignored) by mother rats and they grew up to be anxious and had decreased ability to deal with stress in their later life.



At present epigenetics is used clinically as a biomarker, and therapeutic targets for epigenetic disorders like cancer, neurodegenerative, and metabolic diseases. Since the epigenetic abnormalities are reversible and intertwine with genetic mechanisms, the novel therapies of epigenetic diseases are being increasingly explored. But the re-methylation and non-specificity of drug action need to be resolved. However, many facts are unclear as to what proportion of the epigenome is sensitive to the environment and are inherited mitotically.

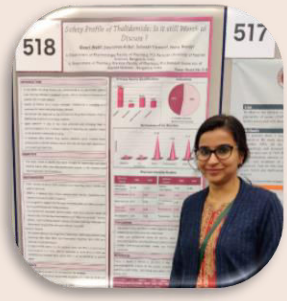
In conclusion, epigenetics is a double-edged sword, the importance of environment in epigenetic changes is far from being resolved. However, modifying or limiting those changes give a ray of hope in controlling epigenetic disorders.

Mrs. Gouri Nair
Assistant Professor
Department of Pharmacology

Reference:

Cortessis VK., Thomas DC., Levine AJ., Breton CV., Mack TM., Siegmund KD et al., (2012). Environmental epigenetics: prospects for studying epigenetic mediation of exposure-response relationships. *Human genetics*., 131(10), pp.1565-89.

Faculty Accomplishments



Mrs. Gouri Nair received a scholarship to attend and present her abstract in the International Society for Pharmacoepidemiology, 12th Asian Conference Pharmacoepidemiology-2019, Kyoto, Japan.

Dr. Kesha M Desai was awarded with "Young Researcher in Pharmacology“ by Venus International Foundation at 1st Annual Health Care Meet-2018, Chennai

Mrs. Sathiya R received Best Poster presentation at World Congress on Pharmacology – Drug Discovery and Development-2019, Indian Institute of Science, Bengaluru

Dr. Md. Azamthulla received “Best Researcher in Antiulcer and Gastro protective activity” award by RULA AWARDS powered by World Research Council and United Medical Council-2019

Mr. Damodar Nayak Ammunje received Bharat Shiksha Ratan Award, awarded by Global Achievers Foundation on the occasion of Celebrating 150th Year of Mahatma Gandhi Birth anniversary-2019, New Delhi

Student's Achievements and Awards

Ms. Kalashanthi R Pyngrope, M. Pharm student won 2nd prize in Oral presentation in 11th annual KSTA Conference held at NMKRV college, Bengaluru

Ms. Radhika, M. Pharm student won consolation prize in Oral presentation in 11th annual KSTA Conference held at NMKRV college, Bengaluru

Ms. Vaishnavi Balraj, M. Pharm student won Best Poster presentation award KrupaconPharma 2019 held at Krupanidhi College of Pharmacy, Bengaluru

Mr. Tanudeep Dutta, M. Pharm student won First prize in debate competition in Intellectual property week 2019 organised by RIPRC in association with Karnataka State Council for Science and Technology, Bengaluru

Write your Feed back & Suggestions to

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