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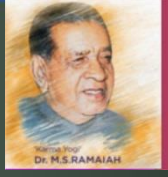

Celebrating the
100th Birth Anniversary of Dr. M. S. Ramaiah
1922 -2022
A great Visionary, who saw the distant future & achieved the impossible,
Visionary Ideas that Transformed millions of lives

CHEMID

E-Newsletter

Inaugural Issue
July 2022

Department of Pharmaceutical Chemistry

New BEL Road, M S R Nagar, Gnanagangothri Campus, Bengaluru, Karnataka 560054

CONTENTS

DEAN'S MESSAGE

Dr. S. Bharath M. Pharm., Ph. D., M.B.A.

Kudos to the team for the Inaugural edition of *"**CHEMID**"*, an official E-News Letter publication from Department of Pharmaceutical Chemistry, Faculty of Pharmacy, M S Ramaiah University of Applied Sciences. At this moment I would like to recall the quote by Peter Atkins - ***"Chemistry begins in the stars. The stars are the source of chemical elements, which are the building blocks of matter and the core of our subject***". I wish this E-Newsletter turns out to be an excellent platform for our institution to highlight the continued achievement of Pharmaceutical Chemistry departmental staff, students to update the latest happenings in the field of Pharmacy. I'm delighted and humbled by the accomplishments we have made as a team in the academic and research domains. My team at FPH would continue to strengthen research and innovation capabilities in order to train highly educated and skilled pharmacists who can meet the challenges locally and globally demanding health-care requirements. We have all of the elements in place with holistic approach of education dissemination to have a significant influence on public health and society. Once you glance this inaugural issue of E-newsletter, I assure you'll be pleased by the success stories of our Faculty team, students and graduates. They've all worked together to make the institution vision a reality. I whole heartedly congratulate and wish ***CHEMID***'s team a great success.

MESSAGE FROM HEAD OF DEPARTMENT

Dr Harish Kumar D R M.Pharm., Ph.D

It's a great feeling of joy and satisfaction to wish for the first issue of the Pharmaceutical Chemistry Department's newsletter. In consonance with the vision of the RUAS and with profound aid and guidance of Hon'ble Vice Chancellor and Dean, the department is pledged to encourage its students as well as respective faculty members to endeavor new ideas for the attainment of academic proficiency.

The newsletter is an academic venture to encourage students and respective faculty members and indulge them in various other institutionally approved activities. The department has designed innovative ideas in computational studies, synthetic chemistry, analytical chemistry and exploring phytochemistry in drug discovery etc. The department is focused to provide high-quality pharmacy education to students with sufficient hands-on training. I hope that this newsletter will serve the purpose of reflecting all the activities of the department and I wish good luck to the entire team of editors and look forward to your kind patronage of our newsletter.

Dr Harish Kumar D R

SUMMARY OF THE DEPARTMENT

Department of Pharmaceutical Chemistry was originally established as a part of MS Ramaiah College of Pharmacy. The postgraduate program in Pharmaceutical Chemistry started in the year 2008. The department was integrated into Faculty of Pharmacy in 2014.

The department provides outcome-based education and training skills on various aspects of drug design using bioinformatics and computational tools, synthesis by conventional and green chemistry approaches, spectral characterization, and pharmacological evaluation of small molecules. Moreover, students get practical training in handling various analytical instruments including UV-Visible spectrophotometer, FT-IR, Flame photometer and HPLC. Students are being trained in maintaining good laboratory and manufacturing practices, documentation of records according to the industrial requirements. Special emphasis is on quality control and quality assurance at every stage of drug manufacturing process for maintaining high ethical standards.

The department has highly experienced staff with a wide range of research expertise in drug design and synthesis, computational chemistry, peptide synthesis, analytical & bioanalytical method development, Pharmacokinetics and metabolism studies. Course delivery and teaching style stimulate students to think, understand and apply the theoretical concepts to find an ideal solution for real-time problems related to healthcare.

Regular guest lectures and workshops by eminent industrialists from renowned pharmaceutical companies and Research scientists from premier institutes help students to keep abreast of the latest trends and developments. The department encourages collaborative projects with Research Institutes and Pharmaceutical industries for post-graduate students to gain knowledge and efficient training under the direct supervision of highly experienced scientific experts.

Students are encouraged to patent their ideas, publish in various peer-reviewed national and international journals, and participate in conferences and seminars to present their project work. We encourage students to work as individuals and teams to develop leadership qualities and adhere to timelines. Students are motivated to organize scientific events, which provides an opportunity to network with peers, improve communication skills and enhance managerial skills to graduate as competent professionals.

EDITORIAL TEAM

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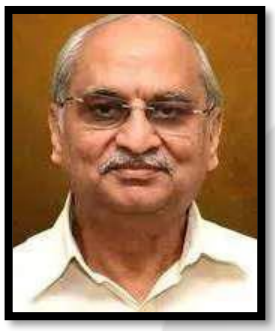
Prof. Kuldeep K Raina
Hon'ble Vice Chancellor



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FACULTY CREW

Dr. Harish Kumar DR
Head of Department

Dr Harish Kumar D R is working as Head of Department and Professor in the department of pharmaceutical Chemistry, Faculty of Pharmacy, Ramaiah University of Applied Sciences. He has academic and research experience of 33 years. Guiding 3 PhD scholars and completed 18 PG projects. Many publications in national, international peer-reviewed Journals and conference presentations to his credit. PhD, PG and UG external examiner, question paper setter and valuator across many universities. Research interest in synthetic chemistry and analytical chemistry. Curcumin and metformin drug conjugates in final stages for patent. He is a life member of APTI and Pharmacy council of India.

Prof. M Narayana Babu
Professor & Academic Registrar

Prof. M. Narayana Babu is working as Professor in the Department of Pharmaceutical Chemistry and also holding additional responsibilities as Academic Registrar – Faculty of Pharmacy, Ramaiah University of Applied Sciences (RUAS). He has a total Academic (Teaching) Experience of 34 years. His research interest includes the design, synthesis and evaluation of various bioactive organic molecules, isolation and identification of plant chemical constituents. He has presented two research papers in international conferences and six research papers in National conferences. He has published three research papers in National and ten research papers in International Journals. He has guided eighteen PG projects in Pharmaceutical Chemistry. He is also serving as member Board of Examinations (BoE) and Board of Studies (BOS), Faculty of Pharmacy, RUAS. He had served as Member PG Board of Studies (BOS), RGUHS, Bangalore, Editorial Advisory Board, IJPER and as reviewer of RGUHS Journal of Pharmaceutical Sciences (RJPS). He is also a Life-member of APTI.

Dr. Judy Jays
Assistant Professor &
Head Mentor

Dr. Judy Jays completed her M. Pharm from Rajiv Gandhi University of Applied Sciences in 1998 with distinction. She did her PhD in Pharmaceutical Chemistry from RGUHS. She has 23 years of teaching experience. She has a Patent to her credit titled "Benzimidazole derivatives of paracetamol as potential analgesic and anti-inflammatory agents". She is an invited speaker and scientific session chair at national conferences and seminars. She has published sixteen papers in various international journals and presented several papers in both national and international conferences. She has won awards in international conferences including best researcher of the conference award by the Royal Society of chemistry. Her area of expertise includes structure-based drug design, virtual screening, synthesis and characterization of novel heterocyclic compounds. She is a reviewer of several international journals. She has been actively involved in organizing various events such as conferences, seminars, webinars and gender sensitization programs in the University. She is a life member of APTI and Pharmacy council of India and member of the Indian council of chemists.

Dr. Suma B V completed her Masters in Pharmaceutical Chemistry from Bangalore University and Ph.D. in Pharmaceutical Sciences from SASTRA University, Tamil Nadu. She has 23 years of teaching experience. Dr.Suma B V has an expertise in designing of molecules of basic nucleus like 1, 3, 4-thiadiazole, Isatin, benzothiazole Pyrazolidinedione derivatives using synthetic route, computational tools, and has experience carrying out in vivo anti-inflammatory, antibacterial activity. She has published more than 25 research papers in national and international journals, attended several conferences, seminar and workshop related on drug discovery, analytical method validation and synthetic drug manufacturing. She has one pending patents to her credit. She is serving as academic Editor of 'Journal of Complementary and Alternative Medical Research' and Editorial Board Member of IJOCPT: International Journal of Chemistry, Pharmacy and Technology, and World Journal of Pharmacy and Pharmaceutical Sciences. She is a reviewer of several peer reviewed journals. She is a life member of APTI and Pharmacy council of India.

Dr. Suma BV
Assistant Professor & BOE

Mrs. Knolin K. Thatchil
Assistant Professor

Mrs. Knolin K. Thatchil is a qualified professional with twelve years of teaching experience, handling projects, theory and practical subjects for undergraduate and postgraduate programmes. She is currently pursuing her Ph D from M.S. Ramaiah University of Applied Sciences in the field of synthetic chemistry. She has attended several national and international conferences. Her present area of research is computational chemistry. She has gained expertise in synthetic chemistry and planning improvise her knowledge in the field of green chemistry and related avenues.

Mrs. Vijaybhanu is working as assistant professor in the department of Pharmaceutical Chemistry, FPH. She has completed her UG and PG from The Tamil Nadu Dr. MGR Medical University with distinction. She has twelve years of teaching experience and is pursuing Ph.D. on Synthesis, characterisation and *in vitro* evaluation of cytotoxic potential of Curcumin-Drug conjugates and pharmacokinetic studies from M.S. Ramaiah University of Applied Sciences. Her research interests are synthetic organic chemistry, prodrugs and synthesis of drug-drug conjugates. She has attended and presented her research work in national and international conferences. She is a life member of APTI.

Mrs. Vijaybhanu
Assistant Professor

Dr. Lakshmi M. Sundar
Assistant Professor

Dr. Lakshmi M. Sundar has a teaching experience of ten years and research experience of five years. During the doctoral programme at CSIR-Central Drug Research Institute, Lucknow, she has worked on Pharmacokinetic and Metabolism studies of herbal fractions and isolated compounds (isoflavones) for osteoprorosis. Her expertise includes development and validation -of bio-analytical method by HPLC and LC-MS/MS. Her research interests are exploring ADME properties of active compounds, design and development of molecules for chronic inflammatory diseases. She has published eighteen papers in various peer reviewed journals, two book chapters and has two patents to her credit. She is an editor of conference proceedings book published by Royal Society of Chemistry. She is listed in AD Scientific Index Rankings for Scientist in 2021 & 2022.

Dr. Yuvapriya MK
Assistant Professor

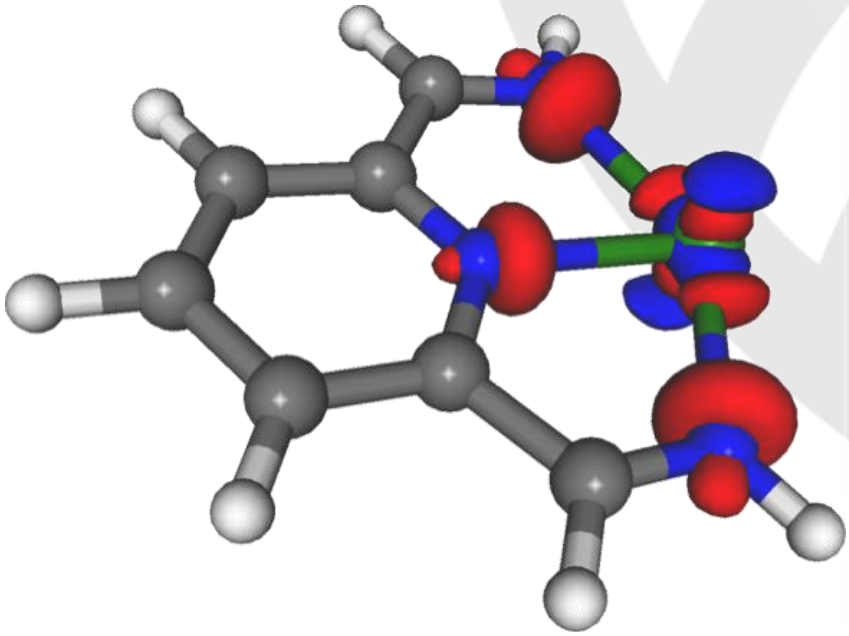
Dr. Yuvapriya MK is working as Assistant Professor in the Department of Pharmaceutical Chemistry, Faculty of Pharmacy, MS Ramaiah University of Applied Sciences, Bangalore. She did her B Pharm & M Pharm in Dr. MGR Medical University, Tamil Nadu. She pursued her Doctoral Studies in Peptide Chemistry at Organic Chemistry Division, CSIR-Central Leather Research Institute, Chennai as GATE Research Fellow. During her tenure, she gained experience in operation (including Two-Dimensional, Diffusion & Relaxation Spectroscopy) and maintenance of NMR Spectrometer. She has four years of teaching & 5 years of Research experience. Her Research expertise includes designing of short anticancer peptidomimics using incorporation of conformationally constrained beta amino acids and different strategies as well as synthesis of those peptidomimics using BOC & FMOC Chemistry, characterization of synthesized peptidomimics using Mass, IR & NMR (especially 2D) Spectroscopy & their biological evaluation by *in-vitro* & *in-vivo* assays revealing the mechanism of action. She has publications in International Journals. She has attended & presented her research work at National and International conferences.

Dr. Parasuraman.P
Assistant Professor

Dr. Parasuraman. P is working as an Assistant Professor in the Department of Pharmaceutical Chemistry, Faculty of Pharmacy, M.S. Ramaiah University of Applied Sciences, Bengaluru, Karnataka, India. He has obtained his Bachelor Degree in Pharmacy (B. Pharm) and Master's degree in Pharmaceutical Chemistry (M. Pharm) from the Tamil Nadu Dr. MGR Medical University, India. As a UGC-BSR meritorious fellow, he obtained his PhD in Pharmacy from Annamalai University, India. Dr. Parasuraman has trained well in organic synthesis, separation, purification and characterization of organic molecules and interpretation by various spectroscopic techniques. He is well trained in Molecular modelling, Structural-based drug design, Ligand-based drug design, QSAR, Pharmacophore analysis, DFT analysis and Molecular Dynamics simulation using computational tools. To his research credit, he has received several awards, filed and published 4 Indian Patents and published more than 50 papers in the International peer-reviewed Journals.

Dr. AR Mahesh
Assistant Professor

Dr. AR Mahesh is currently working as an Assistant Professor at Department of Pharmaceutical Chemistry, Faculty of Pharmacy, Ramaiah University of Applied Sciences, Bangalore. He has 9+ years of teaching experience, He graduated B. Pharm in Dayananda Sagar College of Pharmacy M. Pharm Pharmaceutical Chemistry from RGUHS, Bengaluru, MBA in Pharma Business Management from ICFAI, Tripura, and PhD under RGUHS. His passion for research has driven up to acquire a 7 Lakh grant from RGUHS, Bengaluru as a Co-investigator for research work in the arena of synthetic chemistry of novel anticancer agents. As an intellectual asset, an outcome of his research works has been published in the Scopus/ Web of Science indexed National and International Journals (28 + scientific publications) and more than 4 book chapters. He was awarded Grade-A for the Continuous education program conducted by IISc, Bengaluru and acquired a proficiency Skill in 1D and 2D NMR Spectroscopy and their applications in Structure Biology. He has expanded his interest to the current IT related application in drug design with cognisance on molecular modelling of new chemical entities. He is an invitee as a resource person on the lateral domains of pharmaceutical sciences such as IPR, Soft skill trainer for UG and PG Students in reputed institutes and designated as a trainer in Faculty Development Program sponsored by RGUHS & APTI, Bengaluru. On prospect of knowledge exchange and development, he is a Life member of Association of Pharmaceutical Teachers of India, Foundation for Health and Environment Research, International Society for Pharmacoeconomics and Outcomes Research & Karnataka State Pharmacy Council.



ONGOING RESEARCH PROJECTS

Doctoral Projects

Research Scholar	Project
Mrs. Vijaybhanu	Synthesis, characterization and *in-vitro* evaluation of cytotoxic potential of Curcumin-Drug
Mrs. Knolin K. Thatchil	Heterocyclic hybrids of pyrimidine derivatives as potent anticancer agents- A computational and experimental approach
Mr. Ramesh Dhani	Analytical method development and validation by RP-UPLC for some anti-diabetic and cardiovascular drugs
Ms. Swaroopa H M	Exploring novel Anticholinesterases for the treatment of Alzheimer's disease
Ms. Jabeen	Development and validation of analytical method for determination of selected Cephalosporin in active pharmaceutical ingredient and its formulation
Mr. Ashwani Gaur	An in vitro ADME & in vivo pharmacokinetic study of novel, pharmacologically active anticancer compounds

PG Projects

Name of Student	Project
Burhanuddin Madriwala	Analytical method validation for estimation of residual solvents in gliclazide using Gas chromatography
Sri Satya Medicharla	Synthesis of benzimidazole derivatives tethered with isoniazid for biological activity
Sabhyatha Gowda	Analytical method validation of gliclazide related substances by HPLC
Shrutika Raut	Hit to lead identification of therapeutic agents for rheumatoid arthritis HIF-1 Alpha
G. Chaitanya Sai	Design, synthesis, characterization and biological evaluation of substituted benzene tethered with azole derivatives
Jhansi Laxmi C.H.	Enrichment of G2019S-LRRK2 kinase inhibitors using machine learning techniques
Jayashree Hiremath	Analytical method development and validation for assay of metformin hydrochloride by RP-HPLC
Jeevitha L.	Potent lead identification for aldose reductase enzyme to treat cataract: a computational and experimental approach
Poornima	Analytical method development and validation for assay of furosemide liquid injection by HPLC
Shraddha Prabhakar Hegde	Machine learning approach on lead identification for potent anti-cystic fibrosis molecules
Vamshi R.	Development and validation of novel analytical method for assay and encapsulation efficacy of Amphotericin B liposomal injection formulation
Mallepalle Srividya	Novel analytical method development and validation of RP-HPLC method for assay and dissolution of procyclidine hydrochloride tablets
Aiswariya	Synthesis of benzotriazole derivatives tethered with isoniazid for biological activity

ARTICLES

An Overview: Different Analytical Methods Developed in Diagnosis of SARS-CoV-2

Dr. B.V. Suma, Assistant Professor, Department of Pharmaceutical Chemistry

Coronavirus was for the first time identified in 1960 as a cause of common cold. It is an enveloped RNA virus, single-stranded with a pleomorphic or spherical shape having projections of glycoprotein. It has various subtypes such as alpha, beta, gamma, and delta coronavirus along with serotypes of each subtype. The human coronavirus (OC43-like and 229E-like) can also be found in bats, pigs, birds, cats, dogs, mice, and whales. Coronavirus can be transmitted through airborne droplets and the replication of the virus occurs in the ciliated epithelium that causes cell damage and inflammatory reactions at the site of infection till date as per WHO has reported approximately around 2 million deaths and excess of mortality of at least three million.

Even today Final diagnosis of COVID-19 infection relies heavily on real-time-reverse-transcriptase polymerase chain reaction (rRT-PCR) positivity, but many several scientists have tried or proposed different spectroscopic and chromatic graphic techniques to identify the different strains of COVID 19

The outbreak of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is pressing public health systems around the world, and large population testing is a key step to control this pandemic disease. Hence different analytical instruments are used to detect the coronavirus like mass spectrophotometer, UV- Visible spectrophotometer, to increase the speed of analysis. Few analytical methods developed are discussed in this article

Wadah Ibrahim et al. have done a pilot study using exhaled breath VOCs in identifying patients with COVID-19 infection based on their underlying PCR status and clinical probability, using GC-MS. The study demonstrated that VOC biomarker profiling can identify COVID-19 patients. In their study 81 patients were recruited between April 29 and July 10, 2020, of whom 52 out of 81 (64%) tested positive for COVID-19 by reverse transcription–polymerase chain reaction (RT-PCR). In their study various chemical groups and, an unidentified peak, were present in higher concentrations in the breath of PCR-positive patients.A regression analysis identified a set of seven exhaled breath features (benzaldehyde, 1-propanol, 3,6-methylundecane, camphene, beta-cubebene, iodobenzene and an unidentified compound) that separated PCR-positive patients with an area under the curve (AUC): 0.836, sensitivity: 68%, specificity: 85%. The authors have concluded that GC-MS-method by exhaled breath biomarkers were able to identify PCR-positive COVID-19 patients and it is first of kind.

Rabia Sanam Khan and Ihtesham Ur Rehman have proposed to develop a spectroscopic test methodology by employing Infrared and Raman spectroscopies as diagnostic techniques to analyze COVID-19 samples and compare spectral results with the current PCR method that is routinely used.

Vibrational spectroscopy will help in understanding the process of viral infection, not only it is rapid and accurate detection but also monitoring, which could lead to understanding its mutation and drug development for COVID-19 as well. The authors also propose that spectroscopy coupled with a multivariate analysis approach could be a powerful tool to explore biomolecules. Artificial intelligence, having the potential to customize deep neural networks that have the ability to learn the spectra, could, after training, make instant predictions regarding spectra can be used for identifying the virus or bacterial infection.

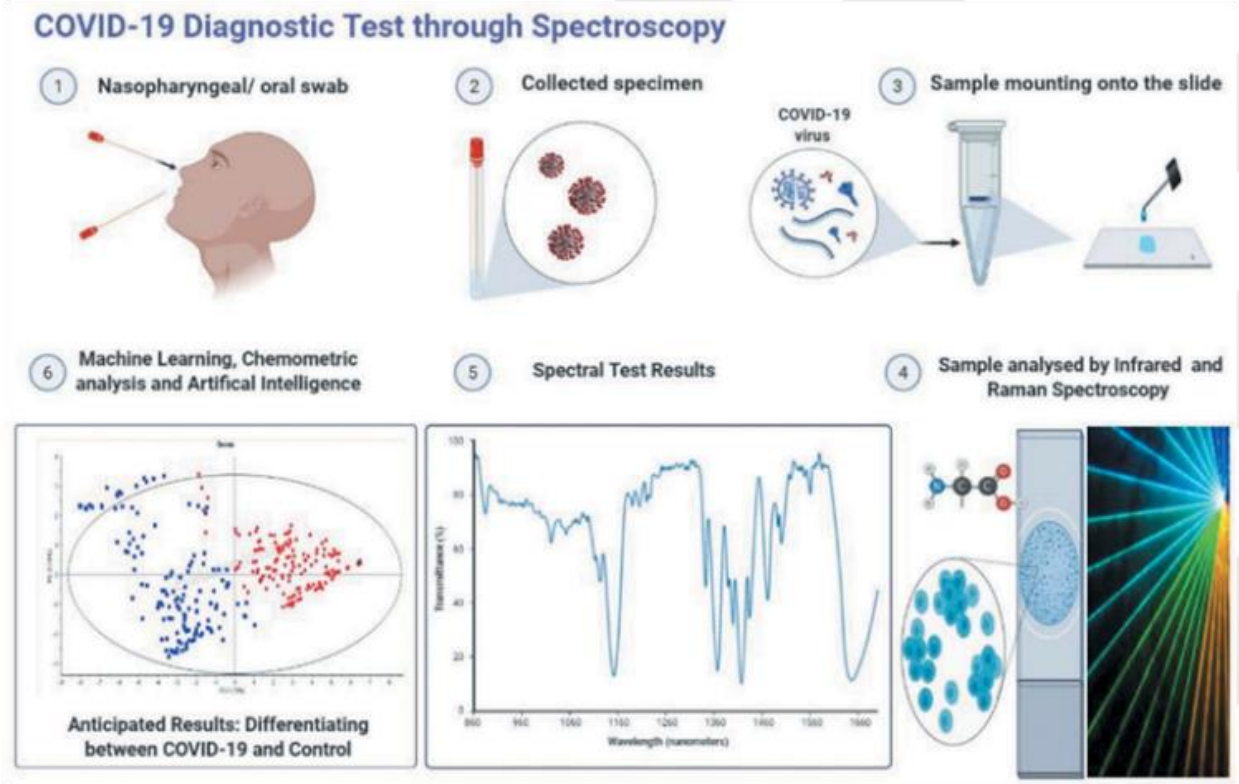


Fig 1. A schematic diagram for vibrational spectroscopy for SARS-COV-2, COVID-19

Proposed by the author The global COVID-19 pandemic has resulted in extensive efforts to develop vaccines to the novel coronavirus. Identifying vaccine targets relies on robust analytical methods to understand SARS-CoV-2 structural biology. Xiaoxiao Liu Matthew A. Lauber focused on understanding the N-glycosylation profile of the SARS-CoV-2 spike protein, which has emerged as a potential target for vaccine development. As glycans often dictate critical glycoprotein structure and function, understanding SARS-CoV-2 spike protein glycans is essential to further therapeutic

development. Based on this process Jennifer M. Nguyen, Matthew A. Lauber from Waters has developed Reversed Phase Liquid Chromatography (RPLC) of Intact SARS-CoV-2 Spike Protein. There study focuses on reversed-phase liquid chromatographic analysis of the intact SARS CoV-2 spike protein. There work demonstrates that using difluoroacetic acid (DFA) as a mobile phase modifier in place of formic acid (FA) results in increased chromatographic resolution during intact protein analysis. The authors suggest that pairing this approach with N- and O-glycosidase treatments may enable more detailed intact protein MS investigations.

Karina Helena Morais Cardozo et al have develop a high-throughput targeted proteomics assay to detect SARS-CoV-2 nucleoprotein peptides directly from nasopharyngeal and oropharyngeal swabs. A modified magnetic particle-based proteomics approach implemented on a robotic liquid handler enables fully automated preparation of 96 samples within 4 hours. The developed TFC-MS system allows multiplexed analysis of 4 samples within 10 min, enabling the processing of more than 500 samples per day. The developed method was validated and data compared with real-time RT-PCR, and found up to 97% specificity. The authors considered the developed method can be used for SARS-CoV-2 testing in large populations.

Daming Wang er.al have developed an amplification-free nucleic acid immunoassay, implemented on a lateral flow strip, for the fluorescence detection of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) RNA in less than one hour. The assay uses DNA probes that are designed to bind to the conserved open reading frame 1ab (ORF1ab), envelope protein (E) and the nucleocapsid (N) regions of the

SARS-CoV-2 genome, and a fluorescent-nanoparticle-labelled monoclonal antibody that binds to double-stranded DNA–RNA hybrids.

Apart from the above few methods many other methods have also been developed for analyzing SARS-COV-2, COVID-19 like fluorimetry, computational studies.

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3. Rabia Sanam Khan and Ihtesham Ur Rehman Spectroscopy as a tool for detection and monitoring of Coronavirus (COVID-19), Expert Review of Molecular Diagnostics, 2020, VOL. 20, NO. 7, 647–649
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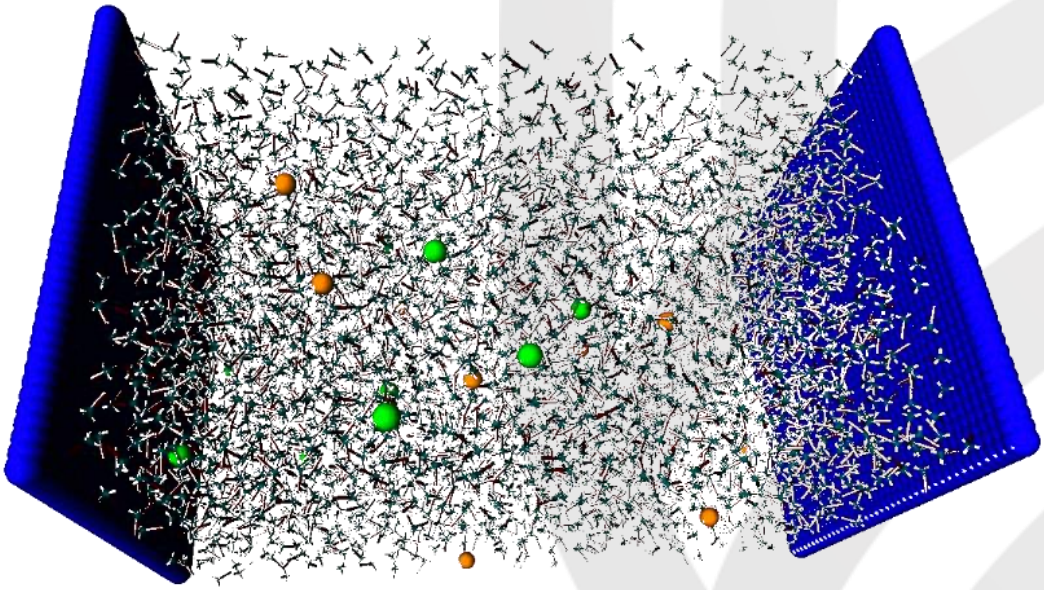

Effect of Quinine Derivatives on COVID-19 Pathway

Aiswarya Raju, Pushpa Devaraj Poojar, M. Pharm (2019-2021)

A novel coronavirus, later named as SARS-CoV-2 originated from Wuhan, China during 2019 December and has rapidly become a global pandemic. Thus, has caused more than ten million of confirmed infections and over a half million deaths. It is a contagious viral infection that can be spread through inhalation or ingestion of viral droplets as a result coughing and sneezing and touching infected surfaces. There have been several attempts to cure and mitigate the effects of SARS Cov 2 infection, but still effective treatment is highly desired.

Quinine and its chemical analogues, chloroquine (CQ) and hydroxychloroquine (HCQ), are part of the 4-aminoquinoline family of compounds. CQ is weak base, synthesized by Bayer in Germany in 1934, and originated as an adequate replacement for natural quinine approximately 70 years ago. Hydroxychloroquine (HCQ) sulphate, a derivative of CQ, was first synthesized in 1946 by introducing a hydroxyl group into CQ and was demonstrated to be much less toxic than CQ. Chloroquine and Hydroxychloroquine have similar chemical structures and cellular mechanisms of action. They exert anti-coronavirus effect by increasing endosomal pH and interfering with glycosylation of cellular receptors (angiotensin converting enzyme 2) for the virus as illustrated in Figure 1. SARS-CoV-2 is a single-stranded RNA-enveloped virus with the ability to infect host cells. This is dependent on the binding of its structural spike glycoproteins to angiotensin-converting enzyme 2 receptors present on the surface of human cells. Once this process is initiated, the 2 transmembrane serine protease (TMPRSS2) primes the S-protein to ease the viral entry into the host cell through endocytosis pathway. Once internalized into the endosomes, SARS-CoV-2 efficiently delivers and spreads the viral nucleocapsid into several intracellular compartments. During the process of viral replication and host infection, a severe inflammatory cascade is activated by intracellular proteins, such as interleukin receptor-associated kinase-1 (IRAK-1), toll-like receptor 7/9 (TLR7/9), cyclic GMP-AMP synthase (cGAS) and phosphorylation of P38 mitogen-activated protein kinases (P38). Viral replication and host infection could be prevented by 4-aminoquinolines in the non-protonated form and protonated form. The non-protonated form diffuses passively across cell membranes and are converted to protonated form increasing the pH. This alkalinization prevents the proteolytic cleavage of viral glycoprotein and the fusion of proteins that are embedded in the membrane of enveloped viruses with the endosomal membrane.

In-vitro activity of CQ and HCQ against the novel coronavirus resulted in appreciable activity *in vivo* with a safe and conventional human dosage. CQ and HCQ were considered the best-known candidates for affecting the frequency of human SARS-CoV-2 infections. Both drugs could block the transport of the virus from early endosomes to endolysosomes, thus preventing the release of the viral genome and

blocking its reproductive cycle. Chloroquine's antiviral and anti-inflammatory activities have consequently taken into account its potent effects in treating COVID-19 pneumonia patients. Currently, no direct supporting data on the effective role of CQ and HCQ in the treatment for COVID-19 exist. Treating COVID-19 patients with CQ/HCQ did not decrease mortality. Besides, CQ/HCQ alone or in combination with AZM increased the duration of hospital stay. Overall virological cure rate and that on days 4, 10, or 14 were not affected by receiving HCQ. Adding AZM to HCQ/CQ did not show any benefit in terms of virological cure as well. The need for mechanical ventilation (MV) was not improved by exposure to CQ/HCQ alone or in combination with AZM. Moreover, CQ/HCQ, did not neither shorten the duration till conversion to negative polymerase chain reaction (PCR), prevent radiological progression, nor affect clinical worsening of the disease. "Solidarity Trial" launched by the World Health Organization reported that remdesivir, HQ, lopinavir/ritonavir, and interferon have little or no effect on overall mortality, initiation of ventilation, and duration of hospital stay in hospitalized patients. Finally summed up that CQ and HCQ do not have the effect of reducing mortality, a number of reports indicated that both drugs appear effective at the earliest stages of the infection.

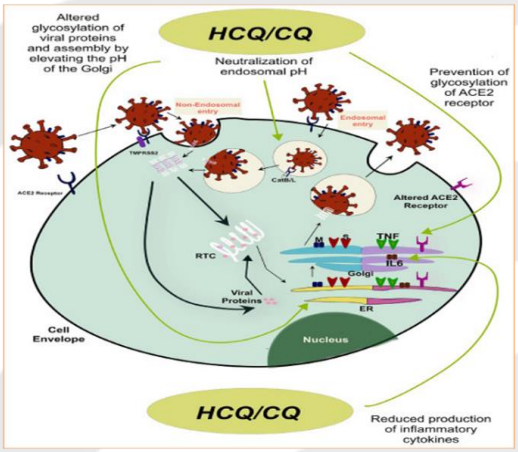

Fig 1: Antiviral effect of quinine derivatives on covid-19 pathway

Reference:

Ghazy, R.M., Almaghraby, A., Shaaban, R., Kamal, A., Beshir, H., Moursi, A., Ramadan, A. and Taha, S.H.N., 2020. A systematic review and meta-analysis on chloroquine and hydroxychloroquine as monotherapy or combined with azithromycin in COVID-19 treatment. *Scientific Reports*, 10(1), pp.1-18

Amphotericin B: Potential Inhibitor Against Mucormycosis

Pooja Hirekodi, Tharun Bharadwaj L, Yasmeen R, M. Pharm (2019-2021)

The outbreak of pandemic coronavirus disease still continuous to be a significant threat around the world. While a few treatment alternatives have been assessed, none with the exception of systemic glucocorticoids and remdesivir have been found to be beneficial to improve endurance in COVID-19. Woefully, use of these glucocorticoids has paved a way for the fungal and bacterial infections. In addition the immune dysregulation caused by the virus and simultaneous administration of immunomodulatory medications for example, tocilizumab could additionally build the danger of contaminations in COVID-19 patients (Garg *et al.*, 2021).

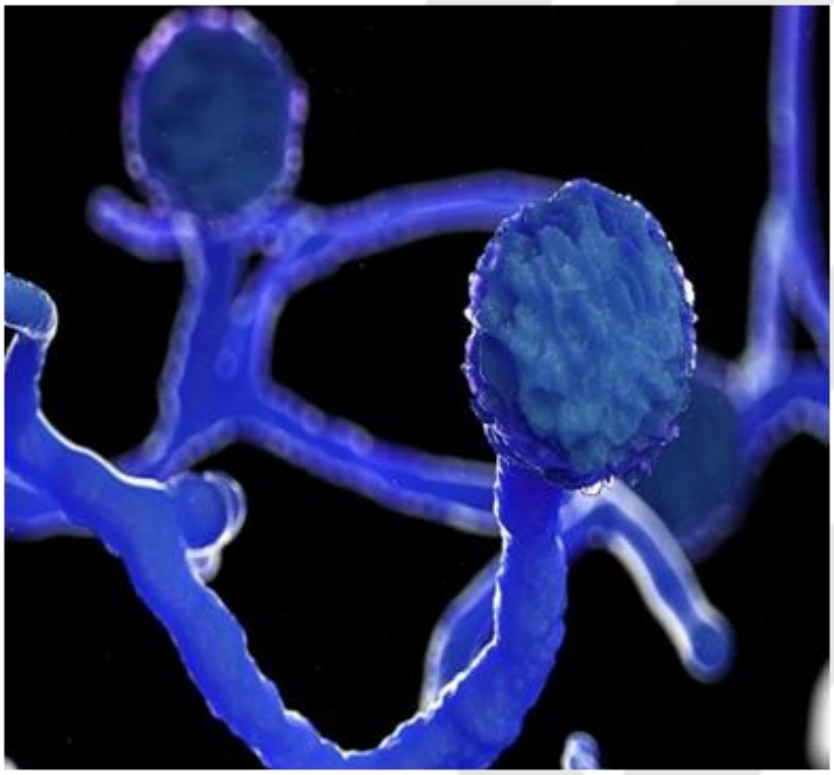

Fig. 1: Mucormycosis

Mucormycosis is one of the most fulminant type of Zygormycosis caused by Mucorales species of the phylum Zygomycota. The nomenclature of Mucormycosis is recommended by the anatomic site of infection instead of mycologic classification like the infection in neck and head region is said as rhino-orbital or rhino-orbital-cerebral Mucormycosis. The other forms are gastrointestinal, disseminated, cutaneous, pulmonary and miscellaneous (Maini *et al.*, 2021).

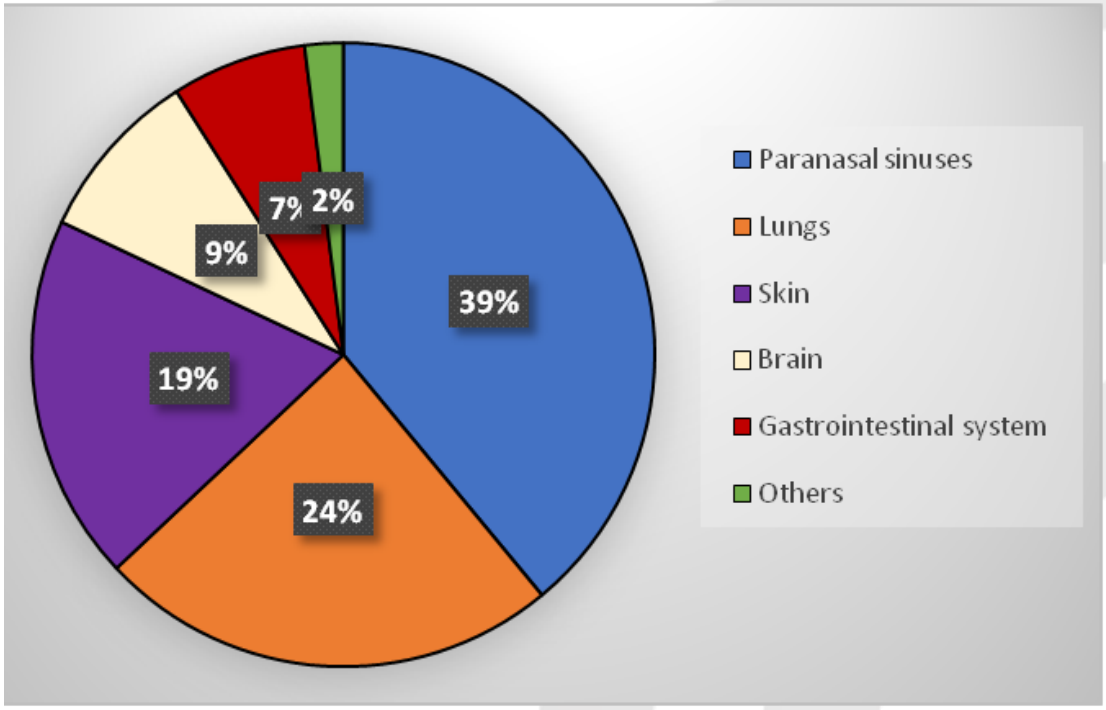

Fig.2: The common varieties of Mucormycosis (Kancharu *et al.*, 2020)

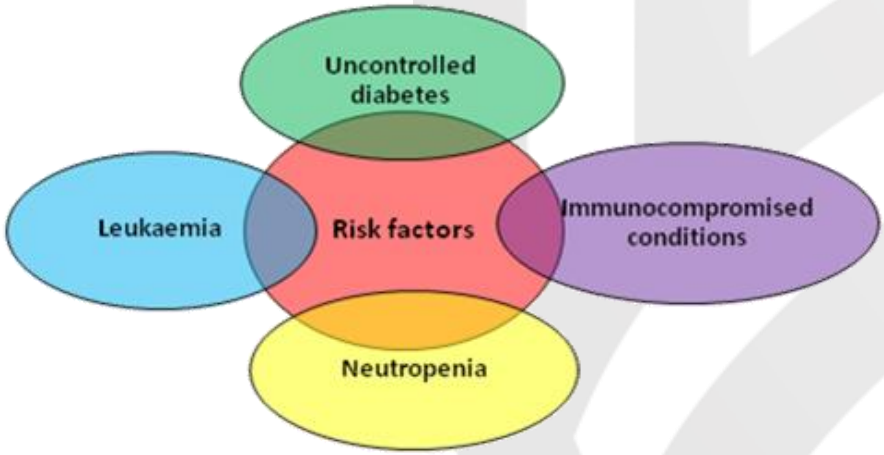

Fig.3: The risk factors associated with Mucormycosis (Maini *et al.*, 2021).

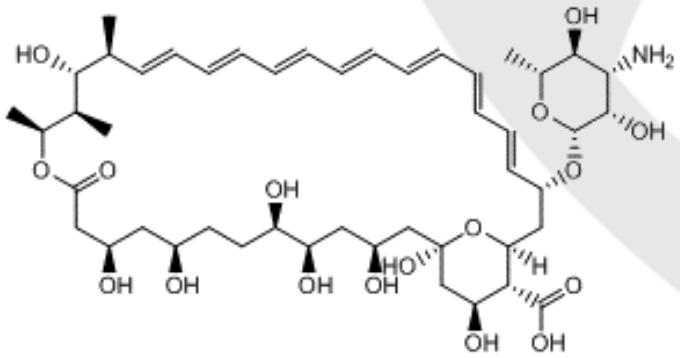

Fig. 4: Chemical structure of Amphotericin B

The management of Mucormycosis includes use of systemic antifungals like Amphotericin B instantaneously at dose of 5–10 mg/kg per day. Amphotericin B is a polyene fungicidal to the susceptible fungi. It is considered as a first line therapy for the treatment of mucormycosis which is strongly recommended by European Confederation of Medical Mycology (ECMM) and The European Conference on Infections in Leukaemia (ECIL) (Brunet and Rammaert, 2020). Amphotericin B acts by interacting via polyene with ergosterol in the fungal cell membrane, which leads to formation of pores and hydrophilic polyhydroxyl chains face the interior of the pore. This pore formation results in the rapid leakage of cations (this accounts for the toxicity) and small molecules into the fungal cell and causing acidification of the fungal interior with precipitation of the cytoplasm and ultimately leading to fungal cell death. However, it Is associated with severe adverse drug reaction including nephrotoxicity; it is always administered along with lipids.

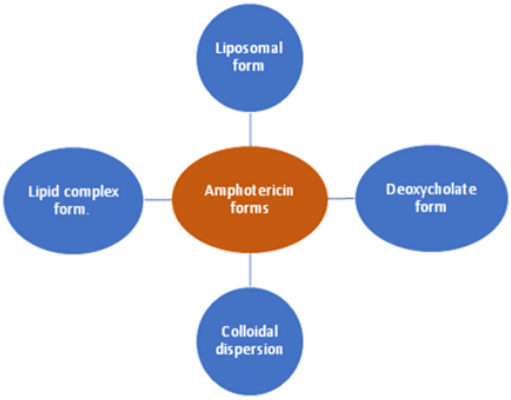

Fig.5: Different forms of Amphotericin

Among them liposome form is considered as superior due to its higher survival rates and its ability to attain greater concentration in the blood with no immediate nephrotoxicity than the deoxycholate form. The disadvantage of lipid complex form is that the extent of central nervous system permeability is less than that of Amphotericin B (Safi *et al.*, 2020). But due to lack of accessibility and expensive its use is restricted to few making it obliged to use plain amphotericin B (Bhandari, Thada and Nagalli, 2021). The two main pillars for the treatment of mucormycosis are medical treatment (Amphotericin B) and surgical debridement followed by second line therapy where Amphotericin B is given along with echinocandins or with triazoles that inhibits the 14-α-demethylation which alters the fungal cell membrane permeability; these includes Posaconazole and Isavuconazole (Maini *et al.*, 2021) (Alekseyev, Didenko and Chaudhry, 2021). All the formulations of Amphotericin B require parenteral route due to its lower oral bioavailability as it precipitates in the aqueous solutions and has lower permeability rates.

Currently Cochelate form, chitosan nanoparticle and self-emulsifying drug delivery systems are in clinical trials. Other antifungal drugs with against Mucorales are being developed. VT-1161 a novel antifungal has shown *in vitro* inhibitor activity against Mucorales. A new long-acting drug PC1244 belonging to azole family has been found effective against Mucorales with MICs from 0.25 to 2 mg/L to which *in-vivo* testing is required (Brunet and Rammaert, 2020). Mucorales contain a peptide called CotH3 which is linked to mucormycosis involved in the invasion by binding to GRP78 which is human endothelial cell receptor. Scientists developed antibodies against CotH3 to prevent the invasion and found to be synergistic with antifungal medications. This

protected the diabetic and neutropenic mice from mucormycosis which is considered as a new approach (Brunet and Rammaert, 2020). Researchers are finding numerous ways to deliver Amphotericin in various forms like recently; IT Hyderabad developed Nano-fibre technology based oral tablets of Amphotericin B to treat fungal infections and Celon laboratories released emulsion-based amphotericin to treat mucormycosis.

Amphotericin B is considered as a first line therapy against mucormycosis, despite its side effects lack of effective antifungal drug has forced to use it. Surgery along with the medication have found to decrease the risk. Developing formulations with respect to the site of infection would be beneficial for example use of nebulized antifungal agents for pulmonary mucormycosis will have great effect.

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Halogens in Drug Design and Diagnosis

Vikas Manu, B. Pharm, VI Semester

Halogens (X = F, Cl, Br, and I), are known for their properties like reactivity and electronegativity. They are highly reactive because they readily gain an electron to fill their outermost shell. In the process of drug discovery, approximately 50% molecules in high-throughput screening are halogenated and around 40% drugs currently on the market or in clinical trials are halogenated. Furthermore, an estimated 25% medicinal chemistry papers and patents involve the addition of halogen atoms at a late stage of the synthesis, which has a wide application in the pharmaceutical sector, including drug discovery, design, clinical trials, and diagnostic agents.

Fig.1: Atomic number and physical state of halogens

Role of halogens in drug design:

Lipophilic character of a molecule can be enhanced by introduction of halogen atoms. Lipophilicity is the most important physico-chemical property of a drug in relation to its absorption, distribution, potency, and elimination. LogP value, an indicator of lipophilicity, is an essential factor for various physico-chemical properties such as solubility, plasma protein binding, CNS penetration, bioavailability etc (Fig. 2) [Lu *et al*, 2012]

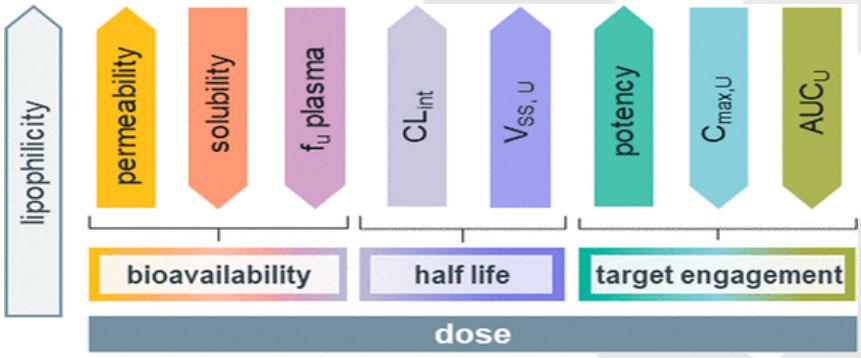

Fig.2: Effect of Log P on physico-chemical properties of a molecule

Halogens, especially the lighter fluorine and chlorine, are widely used as an isostere of hydrogen, amide and esters. Isosteres are groups or molecules which have chemical and physical similarities producing broadly similar pharmacological effects. Substitution with isosteres like halogens in drug design improves selectivity, stability and pharmacokinetics; reduces side effects and toxicity (Fig. 3) [Soffers *et al*, 1994]

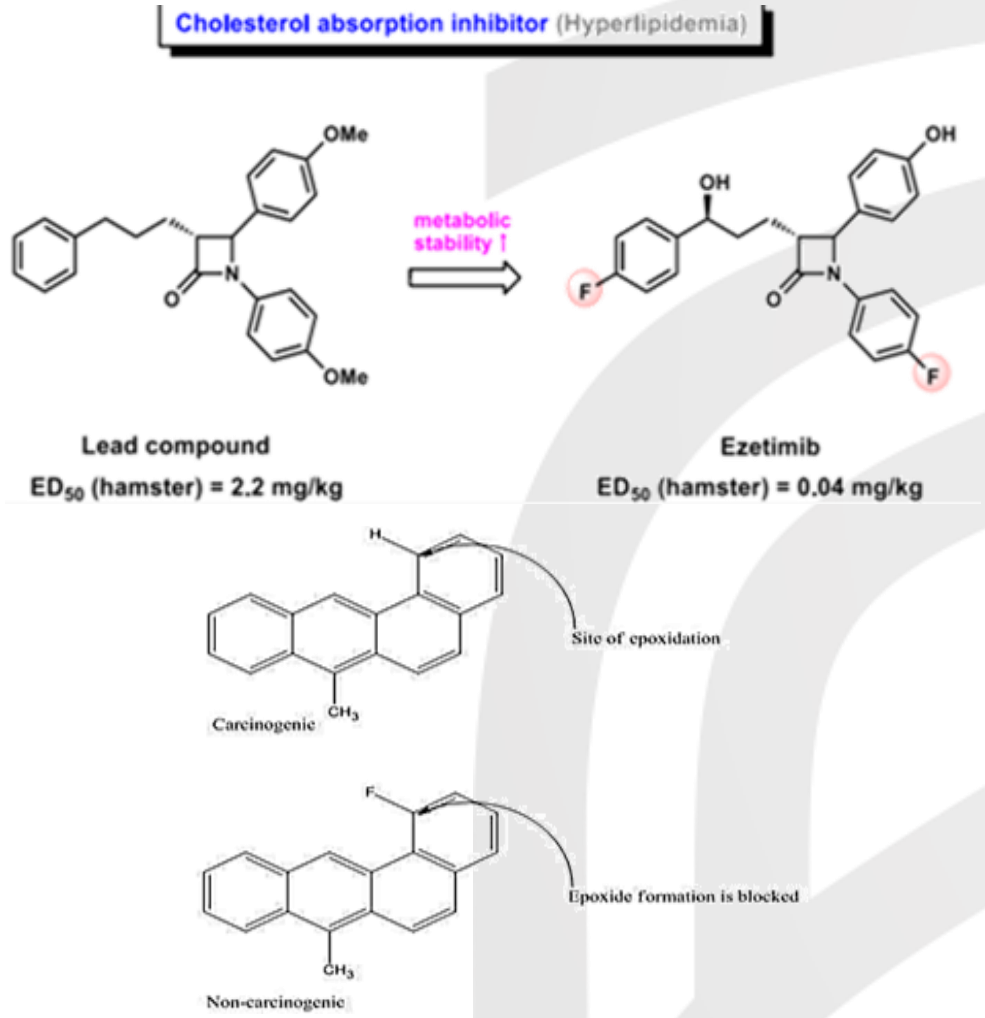

Fig 3: (a) Fluorine substitution in lead compound enhanced metabolic stability of ezetimibe (b) Fluorine substitution in carcinogenic compound led to non-carcinogenic compound

Overall halogens are important entity in various class of drugs to build their SAR (Structure-activity-relationship) such as in general Anesthetics (desflurane, isoflurane, halothane), NSAIDs (indomethacin, zomepirac, diclofenac sodium) and phenothiazines (position of halogen is must for its activity, example: chlorpromazine) and benzodiazepines(ethchlorvynol) (Fig 4).

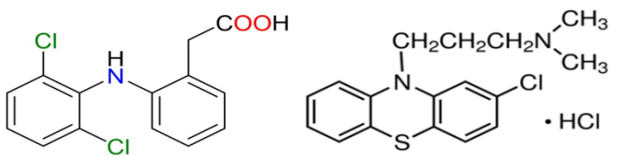

Fig. 4: (a) Chemical structure of chlorpromazine and (b) diclofenac sodium

Halogens in biological system and diagnosis:

Halogens also play an important role in living systems as an essential electrolyte and therapeutics. Chloride works with other electrolytes, such as potassium, sodium, and bicarbonate, to help regulate the amount of intracellular and extracellular fluid in the body and maintain the acid-base balance. Acidifiers such as ammonium chloride are used to treat Achlorhydria/hypochlorhydria [Jentsch *et al*, 2003]. Iodine is important for the functioning of the body's thyroid gland. Without iodine, thyroid hormones cannot be produced, which results in hypothyroidism.

These halogens are also widely used as diagnostic agents. The radioactive isotope Iodine-123 is considered as the diagnostic agent of choice for brain, thyroid, and renal imaging and uptake measurements, while Iodine-131 is used to diagnose diseases of the brain, lungs and thyroid gland. The radioactive Iodine-125 is useful as a cancer therapeutic agent [Hou and Ding, 2009].

Fluoride prevents cavities by making the enamel more immune to the action of acids. They accelerate the buildup of healthy minerals in the enamel, which treats tooth plaque, a mild form of gum disease (gingivitis), weak and brittle bones (osteoporosis). Fluorine also plays an important role in the diagnosis and treatment of many CNS diseases, including neurodegenerative disorders such as Alzheimer's and Parkinson's diseases [Carter and Beaupre, 1990].

Bromine-based drug molecules are used in many over-the-counter and prescription drugs for treating various health problems. Due to its ability to diminish sensitivity of the central nervous system, bromide ions have been used as sedatives, antiepileptics, and tranquilizers. Though halogens have numerous applications in drug design, development and diagnosis, they have their own limitations. Increase in the affinity of ligand molecules due to strong bonding with target protein could lead to their toxicity, especially if halogenated drug molecules have a narrow therapeutic window [Xu *et al*, 2014]

Future aspects:

Halogens have gained widespread interest in the past years for hit-to-lead-to-candidate optimization aiming at improving drug–target binding affinity, Furthermore, halogens are observed in proteins with different functional characteristics, including hydrolases, transferases, oxidoreductases, lyases, isomerases, ligases, and transporters, nearly 20% of which are involved in the absorption, metabolism, distribution, elimination and toxicity (ADME/T) process. Thus, more attention should be paid in the future in the selection of scaffold with halogens for ligand-protein interactions and ADME/T property optimization, during drug design, discovery and development [Hernandez *et al*, 2010].

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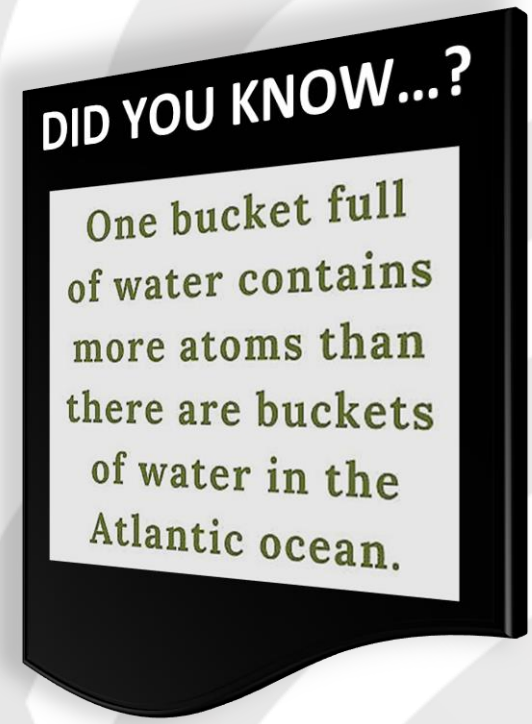
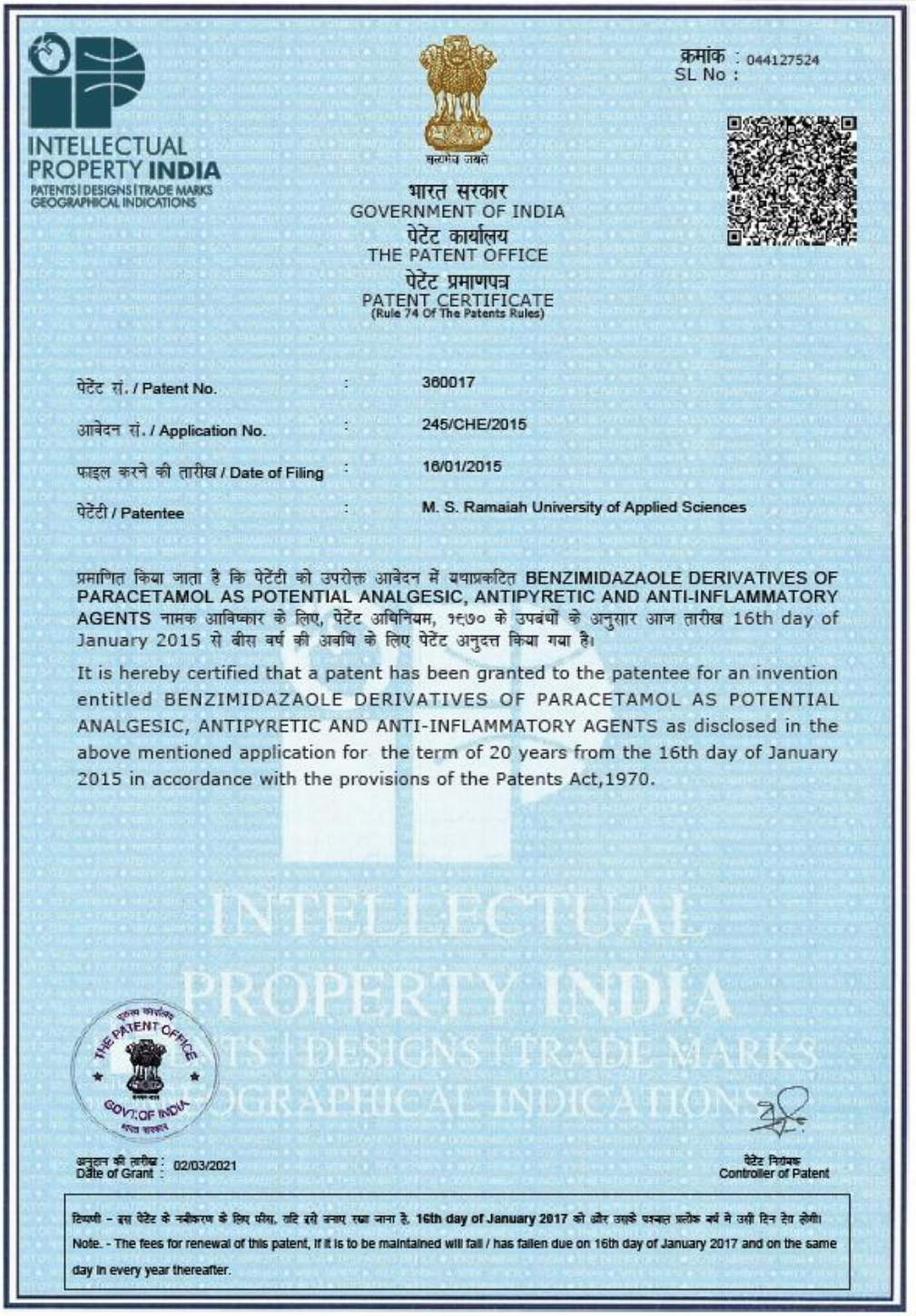


ACHIEVEMENTS

Patent



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सत्यमेव जयते

क्रमांक : 044127524
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GOVERNMENT OF INDIA
पेटेंट कार्यालय
THE PATENT OFFICE

पेटेंट प्रमाणपत्र
PATENT CERTIFICATE
(Rule 74 Of The Patents Rules)

पेटेंट सं. / Patent No.	:	360017
आवेदन सं. / Application No.	:	245/CHE/2015
फाइल करने की तारीख / Date of Filing	:	16/01/2015
पेटेंटी / Patentee	:	M. S. Ramaiah University of Applied Sciences

प्रमाणित किया जाता है कि पेटेंटी को उपरोक्त आवेदन में यथाप्रकटित BENZIMIDAZAOLE DERIVATIVES OF PARACETAMOL AS POTENTIAL ANALGESIC, ANTIPYRETIC AND ANTI-INFLAMMATORY AGENTS नामक आविष्कार के लिए, पेटेंट अधिनियम, १९७० के उपबंधों के अनुसार आज तारीख 16th day of January 2015 से बीस वर्ष की अवधि के लिए पेटेंट अनुदत्त किया गया है।

It is hereby certified that a patent has been granted to the patentee for an invention entitled BENZIMIDAZAOLE DERIVATIVES OF PARACETAMOL AS POTENTIAL ANALGESIC, ANTIPYRETIC AND ANTI-INFLAMMATORY AGENTS as disclosed in the above mentioned application for the term of 20 years from the 16th day of January 2015 in accordance with the provisions of the Patents Act,1970.

THE PATENT OFFICE GOVT. OF INDIA

अनुदान की तारीख :
Date of Grant : 02/03/2021

पेटेंट नियंत्रक
Controller of Patent

टिप्पणी - इस पेटेंट के नवीकरण के लिए फीस, यदि इसे बनाए रखा जाना है, 16th day of January 2017 को और उसके पश्चात प्रत्येक वर्ष में उसी दिन देय होगी।
Note. - The fees for renewal of this patent, if it is to be maintained will fall / has fallen due on 16th day of January 2017 and on the same day in every year thereafter.

Dr. Judy Jays has been granted to the patentee for an invention entitled “Benzimidazaole Derivatives of Paracetamol as Potential Analgesic, Antipyretic and Anti-Inflammatory Agents” in March 2021.

Publications

Nilofer Gerald Arakal, Vaishali Sharma, Avinash Kumar, Kavya B, Devadath NG, S Birendra Kumar, Krishna Murthy T P, **Manikanta Murahari**. (2021) 'Ligand-based design approach of potential Bcl-2 inhibitors for cancer chemotherapy', Computer Methods and Programs in Biomedicine, 209, p. 106347. doi: 10.1016/j.cmpb.2021.106347.

Ankita Kumari, Chethan D.V, Diya Shetty, Everlyse Fernandes, Suma KB, **Judy Jays, Manikanta Murahari.** Structure-based pharmacophore modelling approach for the design of azaindole derivatives as potential DprE1 inhibitors for Tuberculosis. Journal of Molecular Graphics and Modelling, Aug 2020,101,107718.

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Book Chapter/s

G. Divyashri, T. P. Krishna Murthy, and **Manikanta Murahari.** Potential of Probiotics in the Management of Lung Cancer, In: Indu Pal Kaur, Parneet Deol (Eds.) Probiotic Research in Therapeutics, Volume 1: Applications in Cancers and Immunological Diseases, Springer Nature Singapore Private te Ltd. 2021, pp. 218-230.

Kamatchi Sundara Saravanan, Selvam Arjunan, Selvaraj Kunjiappan, **Parasuraman Pavadai, and Lakshmi M. Sundar.** Phytoconstituents as lead compounds for Anti-Dengue Drug Discovery. Anti-Viral Drug Discovey, Advances in Experimental Medicine and Biology, Springer, 2021; 159 – 193.

Abstracts in Conference Proceedings

N. Chinmayi, Y. C. Sunil Kumar, and **Manikanta Murahari.** Synthesis of 3, 4-dihydropyrimidin-2(1H)-one derivatives and evaluation of their antibacterial activity. Proceedings of International Conference on Advances in Materials Research (ICAMR-2019), AIP Conference Proceedings 2274, 050010 (2020). ISBN: 978-0-7354-4004-3.

P. Vijaybhanu, D.R. Harish Kumar, L. Ramya and **C. H. S. Venkataramana,** Design, Synthesis, Characterisation and Antifungal Activity of Novel Pyrimidone Derivatives, Conference Proceedings, Conference on Drug Design and Discovery Technologies (CDDT) with Royal Society of Chemistry, Special Publication No. 355, 2019.

Pretisha Cutinho **C.H.S. Venkataramana Suma Venkatappa** *In-Silico* Hit Identification, Drug Repurposing, Pharmacokinetic and Toxicity Prediction of c-Met Kinase Inhibitors for Cancer Therapy, Conference on Drug Design and Discovery Technologies (CDDT – 2019), 54-59

R. Deepa**, Lakshmi M. Sundar, P. Parasuraman** and C. F. Sharon. Design, Molecular Docking, Synthesis and Anti-fungal Activity of Novel Benzimidazole Derivatives. Conference on Drug Design and Discovery Technologies. Royal Society of Chemistry, 2019: 108 -111.

S. Rajatha, K. Dinesh, **Lakshmi M Sundar**, N. Shruthi and M. Sylvia. Analysis of Interaction between Chlorine Dioxide and Bispyridine-based Irrigating Solution – an Observational Study. Conference on Drug Design and Discovery Technologies. Royal Society of Chemistry, 2019: 108 -111.

Sharon CF, Bharath S and **Judy Jays**. In Silico Prediction and In Vivo Wound Healing Indicators of Nano Chitin Incorporated Lyophillised Alginate Matrices. Conference on drug design and discovery technologies. Royal Society of Chemistry, 2019

Conference Presentations

Poster Presentations

Tharun Bharadwaj. L, **B V Suma**, and C H S Venkataramana. In-silico drug design of benzothiazole tethered with isoniazid as antituberculosis agent against shikimate kinase. National conference on "Recent advancement in pharmaceutical sciences" organized by devsthali Vidyapeeth College of pharmacy. January 18 - 21, 2021.

Sushma M, **B V Suma, Narayana Babu. M, C H S Venkataraman** Comparative evaluation of pharmacological activity of novel Benzothiazole-Azetidinone Hybrid compounds by molecular docking studies National conference on "Recent advancement in pharmaceutical sciences" organized by Devasthali Vidyapeeth College of Pharmacy. January 18 -21, 2021.

Aiswarya Raju and **Judy Jays**. Molecular Docking studies of Novel Furan-Azetidinone hybrids as potent Inhibitors of Candida albicans. International Conference on Bioinformatics, Computational Biology and Biomedical Science - 2021 (ICBCBBS-2021). May 15-16, 2021.

Pushpa D Poojar and **Parasuraman P.** Molecular Docking, Molecular dynamic studies of novel benzimidazole derivatives as Potent Anti-Bacterial agents. International Conference on Bioinformatics, Computational Biology and Biomedical Science - 2021 (ICBCBBS-2021). May 15-16, 2021.

Tharun Bharadwaj L, **B V Suma and Harish Kumar D. R** In-silico drug design of benzothiazole tethered with isoniazid as anticancer agent against various targets, Society of xenobiotics 2021 ,14-17th July 2021.

Aiswarya Raju and **Judy Jays.** *In-silico* Molecular Docking and ADMET Prediction studies of novel furan-azetidinone hybrids as potent inhibitors of Staphylococcus aureus, Society of xenobiotics 2021, 14-17th July 2021

Burhanuddin Madriwala**, Suma B.V. and Harish Kumar D.R.** Molecular Docking Study of Hentriacontane for Anticancer & Antitubercular Activity, Society of xenobiotics 2021 ,14-17th July 2021

Yasmeen. R, **Parasuraman. P and Lakshmi M. Sundar**. Design, synthesis and evaluation of anti-inflammatory activity of pyrazoline derivatives. 12th Annual Charles Jarowski Symposium in Pharmaceutical Sciences. St. John's University, New York, eposter. September 2021.

Oral Presentations

Pooja Hirekodi & M**anikanta Murahari.** Molecular Docking Study of novel 1,3,4-thiadiazoles as Inhibitors of Essential Targets Towards Antimicrobial Drug Discovery International Conference on Bio-informatics, Computational Biology & Biomedical Science – 2021 (ICBCBBS-2021). May 15-16, 2021.

R. Yasmeen, **P. Parasuraman and Lakshmi M. Sundar**. Molecular docking studies of pyrazoline derivatives for anti-inflammatory activity. International Conference on Bioinformatics, Computational Biology and Biomedical Science - 2021 (ICBCBBS-2021). May 15-16, 2021.

Workshops/Webinars Organized by the Department

Webinar on "Drug Discovery - New Lead from Old Drugs" on 06-Jun-2020.

Three Day International e-Workshop on "Docking, QSAR and Molecular Dynamics" from 29 to 31 July 2020.

Guest Lecture entitled "Entrepreneurial Journey with Science: A Walkthrough" on December, 5th, 2020.

Two Day Virtual workshop entitled "Two Day International Hands-on e-Workshop on AI-ML in Drug Discovery" on 22nd & 23rd January, 2021.

Guest lecture on "Inspiring Journey of a woman entrepreneur" on 8th March 2021.

Webinar on "Tips and Tricks to crack GPAT & NIPER" on 27th November 2021.

Resource Persons for Webinars/Workshops/Conferences

Prof M. Narayana Babu, Dr. B. V. Suma and Dr. Judy Jays have been invited to be a Jury member for Oral Presentation session on Recent Advancements in Pharmaceutical Sciences and Biotechnology Sector, National Conference organized by Devsthali Vidyapeeth College of Pharmacy, Rudrapur, Uttarakhand and sponsored by Uttarakhand Biotechnology Council, during 18 - 21, January 2021 and 11 - 13 February 2021.

Dr. Judy Jays was invited as a resource person for the Two Days National Conference on "An Insight into Current Drug Research and Development" November 12th & 13th, 2019. Conducted by Dr. MGR educational and research institute in association with IPA.

Dr. Judy Jays was invited as a resource person for online national webinar on "Drug Discovery-Need of the hour" on 18th May 2021

Dr. Manikanta Murahari has been invited to be Adjudicator for e-poster/e-oral presentations in the International e-Conference on Recent trends in Pharmaceutical Research held on 28th and 29th October 2021 at Nirmala College of Pharmacy, Mangalagiri, Andhra Pradesh, India

Dr. Manikanta Murahari was invited as Speaker for Webinar Series and Hackathon on "Drug Discovery Today" At Department of Biotechnology, RV College of Engineering with Department of Clinical Research, Narayana Hrudayalaya Limited, Bangalore from 14th-19th Sep 2020.

Dr. Manikanta Murahari was invited as Resource person for Online Guest Lecture on "Application of computational methods in drug design and discovery" At K. L. College of Pharmacy, Koneru Lakshmaiah Education Foundation, Vijayawada on 25th Jan 2021.

Dr. Manikanta Murahari was invited as Resource person for One Day National Virtual Seminar on- "Computer-Aided Drug Designing- A

milestone in Drug Discovery" organized by Department of Pharmaceutical Chemistry, College of Pharmaceutical Sciences, Dayananda Sagar University on 9th April 2021.

Dr. Manikanta Murahari was invited as a Jury member for Final Round of 15th Inter-Collegiate/Institute/Department Avishkar Research Convention: 2020-21 organized by Department of Students Development, University of Mumbai for Medicine and Pharmacy category and UG level on 24th June 2021.

Dr. Parasuraman. P was invited as a resource Person for International e-Workshop on "Docking, QSAR and Molecular Dynamics" Organized by Department of Pharmaceutical chemistry, Faculty of Pharmacy, M.S. Ramaiah University of Applied Sciences Bengaluru, Karnataka, India on 29th-31st July 2020.

Dr. Parasuraman. P was invited as Speaker for the online short training program on "Molecular Modeling and Drug Design", organized by School of Bio and Chemical Engineering, Department of Biotechnology, Kalasalingam Academy of Research and Education, Krishnankovil, Tamil Nadu, India on 11th-13th, August 2020.

Dr. Parasuraman. P was invited as Speaker for the online short training program on 'Drug Design and Molecular Modeling", organized by School of Bio and Chemical Engineering, Department of Biotechnology, Kalasalingam Academy of Research and Education, Krishnankovil, Tamil Nadu, India on 08th-10th January 2021.

Dr. Parasuraman. P was invited as speaker for National Webinar on "Computer Aided Drug Designing – A milestone in drug Discovery", Organized by Department of Pharmaceutical Chemistry, College of Pharmaceutical Sciences, Dayananda Sagar University, Karnataka, India on 9th April, 2021.

Dr. Parasuraman. P was invited as speaker for National Webinar on "Applications of Molecular modelling in drug Discovery". Organized by MNR College of Pharmacy, Hyderabad, Telangana, India on 29th April, 2021.

Dr. Parasuraman. P was invited as Speaker for the Virtual Workshop program "Drug Discovery, Molecular docking, ADMET and QSAR studies' Organized by Department of Pharmacology, Karpagam College of Pharmacy, Coimbatore, Tamil Nadu, India on 19th July 2021.

Blockbuster drug

Atorvastatin, an anti-hyperlipidemic (Trade name – Lipitor) is the blockbuster drug of Pfizer, USA. It is the World's best selling medicine with more than 125 billion dollars sales during 1996 – 2012.

Awards

Faculty

Dr. B. V. Suma has been honored **"The Innovative Global Scientific Researchers Educationalist-Professionals & Journalist Awards and Fellowship Honors** Convocation 2020-21" 2021.

Dr. Judy Jays received **"Annual Exemplary Faculty"** award from Ramaiah University of Applied Sciences, September 2021.

Dr. Parasuraman. P received **"Annual Exemplary Faculty"** award from Ramaiah University of Applied Sciences, September 2021.

Dr. Judy Jays has been awarded "**Best Researcher**" award from Royal society of Chemistry, London and 1-year subscription of 'Analyst' in International Conference On Molecular Structure and Instrumental Approaches, November, 2020.

Dr. Judy Jays received "**Best Oral Presentation award**" in International Conference On Emerging Strategies In Antimicrobial Agents And Bio-Innovations, December, 2020.

Dr. Judy Jays has been awarded **"Outstanding Professor of RUAS"** by Ramaiah University of Applied Sciences in February 2020.

Dr. B. V. Suma has been conferred **"Women of Science Award"** by Ramaiah University of Applied Sciences in February 2020.

Dr. Parasuraman. P received "**BEST RESEARCHER AWARD"** from ESN Research group at Hotel Turyaa, Chennai, India on 28th September 2019.

Dr. B. V. Suma has been awarded the prestigious **"Adarsh Vidya Saraswati Rashtriya Puraskar"** by Glacier Journal Of Scientific Research in 2018.

Students

Sushma M, (Batch 2019-2021) has been awarded **"Third"** prize for the poster presentation of the topic Comparative evaluation of pharmacological activity of novel Benzothiazole-Azetidinone Hybrid compounds by molecular docking studies National conference on "Recent Advancement in Pharmaceutical Sciences" organized by devsthali Vidyapeeth College of pharmacy. January 18 -21, 2021.

Ms. S. V. S. Sasipriya, M. Pharm (Batch 2018-2020) has been awarded **"First"** prize for her oral presentation "Preparation and evaluation of omega 3-fatty acid supplement from natural source" in International workshop and Conference on Nutraceuticals, Herbal Supplements and Nano formulations, organized by International Unit on Macromolecular Science and Engineering and Mahatma Gandhi University, Kerala, 13 – 15 September 2019.

"The average drug developed by a major pharmaceutical company costs at least **$4 billion**, and it can be as much as **$11 billion**!

GPAT 2022 QUALIFIERS

Harshini Anand

Punith M

Simran Kumari

Tejeswini

Mohammed Muthair

Prakash

SM Prakruthi

Aryan Gupta

Jahnavi Jaolekar

Vikas Manu

Sudatt Dixit

MESSAGE TO STUDENTS

Prof C H S Venkataramana,

Fmr HOD - Pharmaceutical Chemistry

At the outset I am grateful to the Editorial board of the newsletter for giving me an opportunity to give a message to the students.

Dear students,

It is almost one year since I retired in April 2021. It's a pleasure to speak to you through this newsletter.

You are all budding Pharmacists. You have chosen a noble Profession, which requires continuous updating of Knowledge. You are Lucky because you are gaining Knowledge in the era of information. Information is available at your fingertips. Assimilation of knowledge is important to serve humanity effectively. My sincere advice for you is never allow even a single word ununderstood/ misunderstood while assimilating knowledge whether you are an undergraduate, postgraduate or Research scholar.

It is never late to start real learning as learning is a continuous process. We should have passion for learning. In the process of learning only we get innovative ideas. There is wide scope for innovation in pharmaceutical chemistry because it is associated with drug discovery. The process of drug discovery is complex and expensive, yet essential for survival of humanity and livestock. Innovation is the basis of success. If you have aptitude for Chemistry, you have ample Opportunity for innovation.

Please remember that Pharmaceutical Chemistry is never a virtual science. It requires desktop as well as working in a wet lab to materialize your innovative ideas. Targeted economical drug discovery with least or no side effects is the ultimate aim of drug discovery process. If that goal is achieved, you stand a chance to get ultimate reward a scientist can ever dream of – Nobel Prize!!!

Wishing you all the best in your journey of assimilating Knowledge. Hoping to hear that an alumnus of Faculty of Pharmacy is part of the team of Nobel Laureates.

RAMAIAH UNIVERSITY OF APPLIED SCIENCES | Faculty of Pharmacy

Faculty of Pharmacy
Department of Pharmaceutical Chemistry

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