

PHARMA COGNIZANCE

AMRITA SCHOOL OF PHARMACY

PHARMA INDUSTRY: CURRENT SCENARIO

Currently the graduates and post graduates in pharmacy find jobs in hospitals, government departments, universities, research institutes, and pharmaceutical companies. The present market updates reveal bright future for jobs in pharmaceutical industries.

Some Statistics

Global market: The value of the global pharma market was estimated to be \$816bn in 2016, representing underlying growth of 4.9%. The US market is the key driver of growth currently representing 39% of the global market.

The Indian Pharmaceutical Industry (IPI) holds a strong position in terms of production volumes in the global pharma market-10% of the world production volumes and a share of around 2.4% in terms of value. IPI is largely dominated by generics drugs as the industry earns around 70% of its revenues from the same. Holds 13th position in terms of production value in spite of holding third position in terms of production volume globally. IPI registered revenue of around USD 33 billion in 2016. Exports form a major part of the industry's turnover - 50% of the sales comes from exports. Lower cost of production coupled by efficient scientific and technical skills of human resources are the prime reasons for growth in exports from India. Of the total exports of USD 16.8 billion during the year 2016-17, 40.6% were to the American continent followed by 19.7% to Europe, 19.1% to Africa and 18.8% within Asia.

Current Scenario

The sales growth rate in India started

slowing down in March 2016 quarter and remained dull in the financial year 2016-17 compared with the corresponding period a year ago. Increase in scrutiny, regulatory intervention which raised quality and compliance issues with the US FDA impacted the export sales. This was also coupled by price erosion in the generic market in USA due to consolidation of distribution channels and increase in competition.

On the domestic front, some regulatory interventions by the government impacted the industry's sales. Implementation of NLEM (National List of Essential Medicines) December 2015 and banning of fixed dose combination (FDC) drugs in March 2016 citing its safety and efficacy as concerns, the main contributing factors. All the above is indicating a changing global pharma landscape. Succeeding in a shifting global market and evolving healthcare landscape will require pharmaceutical companies to adopt innovative business models focused on novel strategies, including:

Emphasis on "economic" outcomes : More attention to the "economic value" of a therapy as a determinant for research funding and commercialization.

Personalized medicine: Shifting from "blockbuster drugs" to "personalized health and wellness." **Externalization and collaboration:** More reliance on external partners, academia, industry consortia and entrepreneurs for innovation, productivity and global expansion.

Globalization: Rapid expansion to pharmerging countries for scientific talent



Sreelakshmi K R
Dr Reddy's Laboratories Ltd

and new markets. Health IT adoption: Investing in new technologies to enable innovation and drive efficiencies.

Road ahead

Even as the industry faces tremendous challenges, the leading companies will overcome today's issues and emerge with their sights set on new opportunities. The progress achieved so far, points to a shared optimism for the industry.

We believe pharma export volumes from India to US will rise as branded drugs of about USD 55 billion are expected to go off patent during 2017-19 which will create an opportunity for CRAMS segment. The immense potential of India in biosimilars market is supported by the fact that India is equipped with sophisticated Research & Development facilities meeting international standards, cost effective labour.



02 RESEARCH NEWS



04 HANDS ON WORKSHOP



06 ACHIEVEMENTS

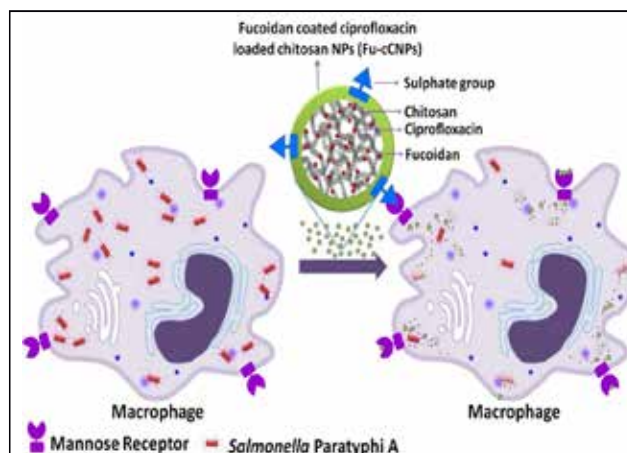


08 PHOTO GALLERY

RESEARCH NEWS

MACROPHAGE TARGETED DRUG DELIVERY; A NOVEL AND EFFECTIVE APPROACH TO TACKLE SALMONELLA INFECTIONS.

Salmonella paratyphi A, a Gram negative bacterium, infects the macrophages and dendritic cells by entering through the intestinal epithelial barrier. These bacteria will survive within the macrophages even after the antibiotic administration as the antibiotics are unable to penetrate into the macrophages. Dr S. Sathianarayanan, Dr. R. Jayakumar and Dr. Raja biswas developed a fucoidan coated ciprofloxacin loaded chitosan nanoparticles. This formulation improved the intracellular delivery of ciprofloxacin into the macrophages to eliminate *Salmonella* infections. Fucoidan and chitosan are the polymers used for the synthesis of nano particles, because they are cyto-compatible and can easily enhance the antibacterial activities. This study gives evidence that interaction of nanoparticles with macrophages can be modulated by the coating of fucoidan on the nanoparticle corona. This study will suggest that fucoidan coated chitosan nanoparticles can be an effective drug carrier for the treatment of *Salmonella* infections. This work was published in **Colloids and Surfaces B: Biointerfaces** 160 (2017) 40–47.

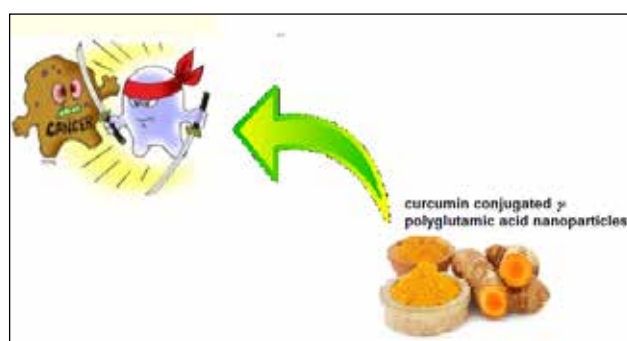


CURCUMIN - γ - POLYGLUTAMIC ACID NANOPARTICLES FOR CANCER

Cancer microenvironment is reported to be heterogeneous with varying redox and pH conditions than the normal tissues. Curcumin is a well studied phytochemical drug which has potential anticancer effect. But its hydrophobicity limits its bioavailability which necessitates nanocarrier systems to overcome rapid metabolism, physicochemical and biological instability for enhanced delivery into the cancer environment. The present study attempted to develop dual responsive

polymer-drug conjugate based on biopolymer γ -PGA and Curcumin by introducing pH responsive hydrazone bond

and redox responsive disulphide linkages to the carrier backbone. This polymeric conjugate was further formulated into nano particles were showed better conjugation efficiency and effective cytotoxicity through sustain therapeutic dosage of Curcumin release compare to previous studies. Due to stimuli-sensitive nanocarriers for Curcumin release in cancer microenvironment which could be efficient stimuli responsive drug delivery system. Thus the dual responsive drug delivery system can be exploited as potential alternative in the field of cancer drug delivery. Dr. R. Jayakumar and Dr. Sathianarayanan along with Mr Shameer Pillarisetti and S. Maya was studied this work and published in **Colloids and Surfaces B: Biointerfaces** 159 (2017) 809–819.



METHOTREXATE IN THE TREATMENT OF PSORIASIS AND RHEUMATOID ARTHRITIS: MECHANISTIC INSIGHTS, CURRENT ISSUES AND NOVEL DELIVERY APPROACHES

The review is focused on the use of methotrexate in drug therapy of psoriasis and rheumatoid arthritis (RA). The pathogenesis of diseases is reviewed and various mechanism of action of methotrexate is detailed. It also gives a panorama of the problems associated with the use of methotrexate in the selected diseases and the guidelines provided by FDA for its safe use. The novel colloidal drug delivery systems of methotrexate, in psoriasis and RA are also reviewed. It seemed that the use of newer colloidal carriers with improved skin permeability by minimizing

its systemic availability will be a useful strategy to reduce the toxic effects of the drug in psoriatic patients. In rheumatoid arthritis patients, the development of newer therapeutic strategies using appropriate targeting ligands that specifically deliver the drug to the inflamed joint space will help to overcome its toxic effects by minimizing the systemic exposure. The review was published by Panonnummal Rajitha, Raja Biswas, Mangalathillam Sabitha and R Jayakumar in **Curr Pharm Des** 2017.

NANOMEDICINE FOR PROSTATE CANCER USING NANOEMULSION : A REVIEW

Sasikumar A, Kamalasanan K of Amrita School of Pharmacy, AIMS healthcare campus, Kochi, recently reviewed the possibilities of developing nanomedicines for prostate cancer. The review finds that, prostate cancer (PCa) is a worldwide issue, with burgeoning rise in prevalence, morbidity and mortality. Targeted drug delivery, a long sort solution in this regard using controlled release (CR) - nanocarriers, is still a challenge. There is an emerging criticism that, the challenges are due to less appreciation for the biological barriers and lack of corresponding newer technologies. Over the years, more understanding about the biological barriers has come with the progress in characterization techniques. Correspondingly, there is a change in opinion about approaches in clinical trial that; focus of the end point need to be shifted towards disease stabilization for these explorative technologies. Currently, there is a requirement to overcome these newly identified

challenges to develop newer affordable therapeutics. The ongoing clinical protocol for therapy using CR-nanocarriers in intravenous injection followed by local targeting to cancer site. This is the most accepted protocol and new CR-nanocarriers are being developed to suit this protocol. In this review, recent progress in treatment of PCa using CR-nanocarriers is analyzed with respect to newly identified biological barriers and design challenges. Possibilities of exploring nanoemulsion (NE) platform for targeted drug delivery to PCa are examined. Repurposing of drugs and combination therapy using NE platform targeted to PCa can be explored for design and development of affordable nanomedicine, is the conclusion as per this review. The review proposes that, in 20 years from now there expected to be numerous affordable nanomedicine technologies available in market exploring these lines. This was published in **J Control Release** 2017.

INVITED TALK@ASP

OBESITY AND NANOTHERAPEUTICS

An invited talk was conducted in ASP in a topic "Obesity and nanotherapeutics" for B.Pharm 4th year and M.Pharm 1st & IInd year by Dr Baskaran Thyagarajan, Assistant Professor, College of Health Sciences, University of Wyoming, USA on 22nd August 2017





HANDS-ON WORKSHOP ON STATISTICAL ANALYSIS USING SPSS

A Hands-on workshop on Statistical Analysis using SPSS was organised by Department of Pharmacy Practice, Amrita School of Pharmacy on 25th and 26th of May 2017. An experienced team of statisticians including the nation's top statistician Dr. K R Sundaram from the Dept of Biostatistics, AIMS, Kochi guided the two day workshop. Chief Guest of the day Dr Shanthi



Nair, Dean research, Amrita university, inaugurated the workshop. The two day workshop comprised of sessions by Ms. Anu Vasudevan, Lecturer, Dept of Biostatistics, AIMS followed by Dr. Senthilvel, Asst. Professor, Dept of Biostatistics, AIMS. Dr. Sundaram, Mr Unnikrishnan, Ms Anu and two students from their team went around to everyone and explained step by step on how to operate the SPSS software. And on the second day Dr. Sundaram and Mr Unnikrishnan's classes gave an insight into the types of sampling methods used for sample size determination.

CONFERENCE AND PRESENTATIONS

Youth in Social change

B. Pharm final year students participated in the contest "Swachh Bharat" during National Conference on "Youth in Social change" organized by Manipal University to strengthen and promote Daan Utsav celebrations especially among the youth and the student community in India on 5th & 6th August 2017. Our teams bagged prizes during the conference.

Consultative Hematology CME meet

*A*n annual hematology CME meet "Consultative Hematology & VIIth ISIBT National Quiz- State level" was conducted by the Cochin Hematology Group held on 24th June 2017 at Holiday Inn, Kochi, Kerala. Mrs Roshni P R, Asst. Professor (Department of Pharmacy Practice) accompanied by 4 students namely Mariam V Joseph, Sharon A Georgy and Shilpa Raj (Pharm D Interns 2016) and Veena Sasakan (M Pharm 2015 batch) Students bagged prizes during the meet.



WORLD PHARMACISTS DAY CELEBRATIONS

World pharmacists day was observed on 25th September 2017 at ASP. The theme suggested by International Pharmaceutical Federation (FIP) for this year was “From research to health care : Your pharmacist is at your service”. The programme was held in two sessions at Amrita School of Pharmacy. The programme was inaugurated by Dr. G P Mohanta, Professor, Dept. of Pharmacy Practice, Annamalai University, Chidambaram. He emphasized on various ways a pharmacist contributes to ensure patient safety. There was a panel discussion in the afternoon session. The members of panel discussion included Dr. G P Mohanta, Professor, Dept. of Pharmacy Practice, Annamalai University, Chidambaram;

Dr. Nishant Gupta, Senior Research Scientist, Arjuna Natural Extracts Ltd, Aluva, Kochi; Mr. Saju C A, Drug Inspector, Dept. of Drug Control, Ernakulam; Ms. Soumya Saroj, Research Scholar, IIT, Chennai; Dr. Ameer Shajahan, Clinical Pharmacist, Aster Medcity, Kochi; Mr. Dinesh PM, Head, Clinical Pharmacy, AIMS, Kochi; Mr. Praveen K S, Senior Scientist, R & D, Biocon Ltd, Bangaluru; Ms. Lekshmi Prabha, Professional Service Executive, Pfizer Ltd, Kerala. They gave an insight to the activities they do in their respective field. They also answered the queries of our students and staff.



PHARMA NEWS

- FDA approved Yescarta (axicabtagene ciloleucel) for CAR-T Cell therapy to treat adults with certain types of large B-cell lymphoma. CAR T therapy involves the engineering of a patient's T cells to express a chimeric antigen receptor (CAR) to target the antigen CD19, a protein expressed on the cell surface of B-cell lymphomas and leukemias. The T cells are then redirected to kill the cancer cells.
- Flexion Therapeutics announces FDA approval of Zilretta (triamcinolone acetonide extended-release intra articular injectable suspension) for osteoarthritis knee pain.
- FDA approved Ascor (Ascorbic Acid Injection, USP) which is an intravenous vitamin C formulation for the short term treatment of Scurvy.



ACHIEVEMENTS

Sl No	Name	Prize	Title	Name of the event	Venue and Date
1	Mr. Thomas Kuruvila, Ms. Sangeetha, Ms. Dona Sheba Scaria	First Prize (Poster)	Waste hub : A new scope for effective waste management through digital India	'Swachh Bharat' contest in the National Conference on "Youth in Social change	Manipal University, 5 th & 6 th August 2017
2	Ms. Athira Anilkumar, Ms. Athira P, Ms. Sumi Sugathan	Second Prize (Poster)	Utilization of waste paper products as a raw material source of cellulose for cellulose based industries".	'Swachh Bharat' contest in the National Conference on "Youth in Social change	Manipal University, 5 th & 6 th August 2017
3	Mariam Varsha Joseph	Third Prize (Oral)	Clinical Profile and treatment related outcomes in Primary Myelofibrosis patients- An Observational Study from Kerala	Consultative Hematology & VII th ISIBT National Quiz- State level"	Holiday Inn, Kochi 24 th June 2017

PHARMA NEWS

- Novo Nordisk receives FDA approval for Fiasp (insulin aspart injection), a new rapid-acting mealtime insulin. Fiasp is a new formulation in which the addition of niacinamide (vitamin B3) helps to increase the speed of the initial insulin absorption.
- FDA approved Verzenio (abemaciclib) for certain advanced or metastatic breast cancers. It is a selective ATP-competitive inhibitor of Cyclin dependent kinases (CDK) 4 and 6 for the treatment of metastatic breast cancer.

PUBLICATIONS 2017 (APRIL- SEPTEMBER)

1. Sreesha N Nair, Alexeyena Varghese, Meenu B, Greeshma Rejimon, Neeraja E D. Comparative evaluation of *Coriandrum sativum* Linn. and *Apium graveolens* for Antimicrobial activity. *Research J.Pharm. and Tech.*10 (2), Feb-2017: 1-4
2. Bini Vincent, Aloysius James, Syamaprasad TV, Reshma Reji, Remya Reghu. A Case Report on Wilson's Disease- Induced Liver Cirrhosis. *Asian J Pharm Clin Res*, Vol 10, Issue 4, 2017: 130-131
3. Mary Jacob, Jeslyn Mary Philip, Gireesh Kumar K.P, Naveen Kumar Panicker. Amphotericin B Induced Hyperbilirubinemia- A Rare Case Report. *Int.J.Pharm. Sci.Rev.Res.*,43(1), March-April 2017: 99-100
4. Amoolya Sree, Shibina K.A, Jahanara Hameed. Pharmacological Review on the All Cure Plant- Gingko Biloba. *Int.J.Pharm.Sci.Rev.*, 43(1), March-April 2017: 243-247.
5. Aiswarya S, Parvathy S, Aneesh T P, Vidya Viswanad. Design and In Vitro Characterization of Metformin Loaded Resealed Erythrocytes. *Asian J Pharm Clin Res* .2017:10 (4).231-238.
6. Vidya Viswanad, Anand P, Shammika P. Advancement of Riluzole in Neurodegenerative Disease. *IJPCR* 2017:9(3) 214-217.
7. Sathianarayanan, Amrutha B Chittethu, Asha Jose, Ranganathan Balasubramanian, Saranya T S, Asha Asokan Manakadan. Utility of Isatin Semicarbazones in Mammary Carcinoma Cells A Proof of Concept Study. *J Young Pharm*, 2017: 9(2): 218-223.
8. Aishwari S Kumar, Thomas Kuruvila, Kavya S G, Rashmi Radhakrishnan, Athira J Nair, Kaladhar Kamalasanan. Early Detection of Seizures in Epilepsy Using Point of Care (POC) Systems. *J.Pharm. Sci&Res.*Vol.9 (3), 2017, 302-306.
9. Leena K Pappachen, Subin Mary Zachariah, Deepthy Chandran. In Silico Design, Synthesis And Characterization of Some Novel Benzothiazole Derivatives As Anticancer Agents. *Asian J Pharm Clin Res*. Vol 10 (4), 2017: 150-155.
10. Revathy Sreedhar, Amrutha Unnikrishnan, Sneha James, Shalumol A, and Leena K Pappachen. Pharmacological Activities of 1,3,4-Oxadiazole Derivatives: A Review. *Res. J. Pharm. Biol. Chem. Sci.* 8(2), March-April, 2017: 468-488.
11. Krishnapriya Raj, Madathil Shintu Mery lype, Lakshmi R. Chlorpromazine Induced Skin Pigmentation- A Case Report. *Int.J.Pharm.Sci.Rev.*43(2), March-April 2017:78-79
12. S Sreeni, Nafiya Muhammed Zackariah, Lakshmi R. A Case Report: Morvan's Syndrome. *RJPT*. Vol 10(4), April 2017: 1-5.
13. Bhama Santhosh Kumar, Rakhi Krishna, Lakshmi PS, Deepa T Vasudev, Sreeja C Nair. Formulation and Evaluation of Niosomal Suspension of Cefixime. *Asian J Pharm Clin Res*. Vol 10, Issue 5, 2017:194-201.
14. Pillai Rutuparna, Dana Merin, Suja Abraham, Noble Motty Thomas, Jahanara Hameed. Assesment of Clinical Effectiveness of Losartan and Amlodipine in Hypertensive Patients With Left Ventricular Hypertrophy. *Asian J Pharm Clin Res* . Vol 10, issue 5, 2017: 368-371.
15. Delma D'Cruz, Anu Babu, Eena Joshy, Aneesh TP. Bioanalytical Method Development and Validation of Ticagrelor By RP-HPLC. *IJAP*. Vol9 (3), 2017:51-54.
16. Teena C Abraham, Greeshma James, Anjana Thomas, Lakshmi R. Sodium Valproate Induced Hyperammonemia with Normal Liver Function: A Case Report. *JPSR*. Vol 9 (6), 2017: 822-823.
17. Nia Lopez, Athira P N, Pooja Ajeesh, Anjali S Nair, Ankitha L, Anupriya. Pharmacology and Bio-Medicinal Properties of Chitin and its Derivative. *JPSR*. Vol9 (6), 2017:857-859
18. Neethu Rajiv, Sreelakshmi N, Jisni Rajan, Dr Leena K Pappachen. A Review on Synthesis of Benzothiazine Analogues. *Research.J.Pharm.and Tec.*10 (6). June 2017
19. Jeslyn Mary Philip. Meenu Vijayan. Liposomal Amphotericin B Induced Pancytopenia A Rare Case Report. *J.Pharm.Sci.Res.*Vol.9 (6), 2017:867-868
20. Karthika Unnikrishnan, Anila K N. A Case Report on Congenital Lobar Emphysema. *Asian J Pharm Clin Res*. Vol.10 (7), 2017:5-6
21. Jithila Rajan, Saranya Krishnan, Sruthy V Menon, Subin Mary Zachariah, Rajasree G Pai, Surya M, Muhammed Javahar, Namy George. In Silico Design, Synthesis, Characterization, In Vitro Anti-Inflammatory, And Antioxidant Studies of 4-Aryl-4H-Chromene Derivatives. *Asian J Pharm Clin Res* .Vol.10 (7), 2017:408-413
22. Arya Rajendran, Shilpa Martin, Reshma Eso, Asha Ashokan, Saranya T.S. Computational Simulation Studies of Various Flavonoid Subclasses on Treating Non-Small Cell Lung Carcinoma Associated With Cigarette Smoking. *JPSR*.Vol.9 (7), 2017:1117-1121.
23. Amoolya Sree, Shibina K.A, Jahanara Hameed. In Vitro Anti-Arthritic Activity of the Polyherbal Formulation- Balapurnavadi Choornam *J.Pharm.Sci&Res.*Vol.9 (8). 2017:1281-1282
24. S Elbi, T R Nimal, V K Rajan, Gaurav Baranwal, Raja Biswas, R Jayakumar, S Sathianarayanan. Fucoidan Coated Ciprofloxacin Loaded Chitosan Nanoparticles for the Treatment of Intracellular and Biofilm Infections of Salmonella. *Colloids and Surfaces B: Biointerfaces*. 160,2017:40-47
25. Shameer Pillarisetti, S Maya, S Sathianarayanan, R Jayakumar. Tunable pH and Redox- Responsive Drug Release From Curcumin Conjugated γ Polyglutamic Acid Nanoparticles in Cancer Microenvironment. *Colloids and Surfaces B: Biointerfaces*. 159,2017:809-819

PHOTO GALLERY

International Yoga Day Celebration (21st June 2017)



Inaguration of new batches (9th August 2017)



Ramayana Celebration (16th august 2017)



Graduation Ceremony (21st August 2017)



Onam Celebration (30th August 2017)



Book Post :

Chief Editor

Dr. Sabitha M
Principal

Editorial Board

**Dr. S Sathianarayanan, Ms. Remya Reghu,
Ms. Saritha A Surendran
Dr. Jaya Thomas**

Published by

Amrita School of Pharmacy,
Amrita University, Kochi – 682 041, Kerala, India



AMRITA
VISHWA VIDYAPEETHAM
UNIVERSITY
Established u/s - 3 of the UGC Act 1956
School of Pharmacy

For comments & Suggestions :

Amrita School of Pharmacy

Amrita University, AIMS Ponekkara,
Kochi -682 041, Kerala, India

Phone : 0484-2857900 / 03/04, 0484-2802020 (fax)

Email : pharmaprincipal@aims.amrita.edu
pharmacycollege@aims.amrita.edu

Website: <https://www.amrita.edu/school/pharmacy>