



PHARMA MONARCH

DEPARTMENT OF PHARMACEUTICS - NEWS LETTER



An Official Publication of

DEVAKI AMMA MEMORIAL COLLEGE OF PHARMACY

(Affiliated to Kerala University of Health Sciences, Thrissur and Approved by AICTE & PCI, New Delhi)

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FROM THE EDITOR'S DESK

Greetings to the Readers!

It gives me a great pleasure to release the First issue of 'Pharma Monarch', the News Letter of Department of Pharmaceutics. On behalf of the editorial board and our teams, I express deep sense of gratitude to our Managing Trustee, in bringing out this venture a reality. We extend our sincere thanks to our beloved Trustee and Manager Mr. M. Narayanan, for the generous support in releasing the first issue of Department News Letter which will serve as a platform for today's pharmacists to share the knowledge and recent advances pertaining to the Pharmacy Profession.

'Pharma Monarch' will provide an ample opportunity to the faculties and students to exhibit their academic achievements and activities and also to educate pharmacy students and explore the new creativity and possible trends in the pharmaceutical formulation.

Overall, it's a fact that this News Letter reflects the activities of Pharmaceutics Department and encouraging department faculties and students, budding researchers and pharmacists, all of whom constitute a precious part of our organization.

On behalf of the Editorial board, I congratulate the faculties and students, who have strived hard to bring this News Letter, which reflects their continuing effort and contribution.

On this prodigious moment, I take the heartiest pleasure in thanking all whose support and guidance made this venture to reach its goal.

I strongly hope that this News Letter will be published with lot many informative articles and research achievements in our next issue and will be beneficial to all the persons dealing in the pharmacy profession.

I do always welcome constructive suggestions and strategic ideas from everyone, for improvement of this News Letter.

I wish them all success in all the endeavors.

Happy reading!

Best Regards,
Prof. Dr. R. Nethaji,
Editor-in- Chief

IN THIS ISSUE

- ☞ About the College ☞ Department Profile ☞ Department Activities
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In the remembrance of
Shri. K.V. Sankaranarayanan
(01.01.1948 - 12.07.2013)
Founder, Devaki Amma Memorial Institutions

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ABOUT THE COLLEGE

Devaki Amma Memorial Trust has established Devaki Amma Memorial College of Pharmacy in the year 2003 with an objective of catering the needs of aspiring population in the neighbourhood and thereby providing quality pharmacy education. The college is located in the northern part of Kerala and is offering D. Pharm., B. Pharm., M. Pharm (Pharmaceutical Chemistry, Pharmaceutical Analysis, Pharmaceutics and Pharmacology) and Pharm. D programmes. The institution is having affiliation with Directorate of Medical Education, Thiruvananthapuram, Kerala University of Health Sciences, Thrissur and approved by Govt. of Kerala, AICTE and Pharmacy Council of India. The college provides excellent coaching for students by qualified and experienced faculties. It organizes frequent guest lectures and seminars by drawing experienced persons from academics and industries, which gives exposure to the students in the field of pharmacy and to make them currently updated. The college is selected by a Centre for research. The placement record proves our potential. Our institution is certified by "Joint Accreditation System of Australia and New Zealand (JAS - ANZ)" an ISO: 9001: 2008 institution.

DEPARTMENT PROFILE

The Department of Pharmaceutics was established in the year 2011 and it offers M. Pharm. (Pharmaceutics) programme. The department trains the students in the areas like Pharmaceutical technology, Pharmaceutical dosage forms, Biopharmaceutics and Pharmacokinetics aspects of the drug as well as their dosage forms. The department is expertise in the research areas such as Preformulation studies, development of different pharmaceutical dosage forms, Nanotechnology drug delivery systems, Mucoadhesive drug delivery system, Buccal & Colon drug delivery system, Transdermal drug delivery system and evaluation of developed dosage forms with respect to in-vitro and in-vivo parameters etc. The department emphasizes the importance of Optimization techniques in pharmaceutical formulations and Good manufacturing practice norms to the students. The department is well equipped research lab with some ultramodern equipments like Dissolution Test Apparatus (8 Basket), Disintegration Test Apparatus (2 Basket), Brookfield Viscometer, Rotary Vacuum Evaporator, Stability Chamber, Bottle Filling Machine, Refrigerated Centrifuge, Microcentrifuge, B.O.D Incubators, Shaker Incubators, Gel Electrophoresis, Paper Electrophoresis, Trinocular Microscope etc. and also equipped with important instruments like Planetary Mixer, Double Cone Blender, Table Sieve Shaker, Tray Dryer, Hand Operated Tablet Compression Machine, Multi-station Tablet Compression Machine (8 Station), Coating Pan, Polishing pan, Manual Hand Operating Capsule Filling Machine, Bottle Filling Machine and Propeller Type Mechanical Agitator.

DEPARTMENT ACTIVITIES

RESEARCH ACTIVITIES

POST GRADUATE RESEARCH PROJECTS

M. Pharm Pharmaceutics Department has successfully completed the research projects for Post Graduate students in this academic year and they are listed as follows:

Project Title	Students Name	Guided by
Formulation and Evaluation of Paracetamol Loaded Mucoadhesive Microspheres	Mrs. Shahana Parvin	Dr. R. Nethaji
Preparation, Characterization and Stability Study of Diclofenac Sodium Transdermal Patch	Mrs. Abida Nalakath	Mr. P. Manikandan

UNDER GRADUATE RESEARCH PROJECTS

Department have also undertaken some research projects at under graduate level and successfully completed in this academic year and listed as follows:



Project Title	Students Name	Guided by
Polycystic Ovarian Syndrome Management and Treatment - An Overview	Asliya P.P, Noosila M.K & Uthra N	Mr. P. Manikandan
Isolation, Characterization and Antibiotic Resistance pattern of Soil Cultures.	Dhaneesh, Haritha U, Radhika Mohandas & Surya CK	Mr. N. S. Surendiran
Formulation and Evaluation of Ecomagic Mosquito Repellent Termitory Lotion	Fida Rinf PT, Aslaha PC, Risna E & Sulfa Sherin	Mrs. Raslamol K
Design and Fabrication of Pollutant Gas Analyzer	Mubashir Ali V.P, Sharon Liz Joy, Megha, Aswathy P.K	Mr. Vimal K.R
Review on Antioxidant, Antidiabetic and Antimicrobial Activity of Artocarpus Heferophyllus	Ahammed Tayyab BK, Lidiya Joseph, Praseeja MK & Sahaila CT	Mrs. Vidya S

ONGOING RESEARCH PROJECTS

The institute is inspired by identifying future needs of human resources to be felt by fast developing academics and scientific research in the area of Pharmaceutics.

Project Title	Students Name	Guiding by
Formulation and Evaluation of Mucoadhesive Microspheres of Losartan Potassium	Mr. Binulal C	Dr. R. Nethaji
Development and Evaluation of Gastro-retentive Cefadroxil Floating Microspheres	Mrs. Sunusha E	Dr. R. Nethaji
Studies on Formulation and Development of Antimicrobial Termitaria Cream and its Evaluation	Ms. Aghi Binoy	Mrs. Raslamol K

RESEARCH PUBLICATIONS

The faculty members are encouraged to involve in research activities. They too involved in research and carried out various activities, which are evidenced by their paper publications in reputed international journals.

Dr. R. Nethaji et al.

Formulation and Evaluation of Propranolol Hydrochloride Loaded Mucoadhesive Microspheres, *American Journal of Pharmacy and Health Research*, Vol.5, Issue 1, 2017, 48-60.

Formulation and Evaluation of Paracetamol Loaded Mucoadhesive Microspheres, *International Journal of Pharmaceutics and Pharmacology*, Vol.1, Issue 2, 2017, 106.

Preparation and Characterization of Floating Microspheres of Ciprofloxacin Hydrochloride, *World Journal of Pharmacy and Pharmaceutical Sciences*, Vol.6, Issue 6, 2017, 1394-1408.

Drug Utilization Evaluation of Antiepileptic Drugs in a Tertiary Care Hospital, *International Journal of Science and Research*, Vol.6, Issue 5, May 2017, 2214-2218.



SEMINARS/CONFERENCES ATTENDED

Our teaching faculties and PG students were sponsored to take part as a delegate in various National conferences to update the current trends and developments in the field of their specialization. It is evidenced by our faculties and students are attended their seminars/conferences are as follows:

Mr. P. Manikandan, Asst. Professor, are participated as a delegates in the ICMR sponsored National conference on "Recent Trends in Nanotechnology in Biomedical Drug Research" organized and conducted by Himachal Institute of Pharmaceutical Education & Research, Nadaun, Himachal Pradesh, held on 25th & 26th February 2017.

Mrs. Anjali Narayanan & Mrs. Binjusha E, Lecture, participated actively as delegates in the National Conference on "Unleashing Novel Strategies in Pharmaceutical Sciences" organized by Govt. College of Pharmaceutical Sciences, Govt. Medical College, Calicut, on 24th March 2017. **Mr. Binulal C**, **Mrs. Sunusha E**, **Ms. Aghi Binoy** (II. M. Pharm) also participated in the said conferences.

Ms. Neema K Ramesh, **Ms. Swetha S**, **Mrs. Vandana G**, **Mrs. Farseena M V** (I. M. Pharm) participated in the National Level symposium on "Biomaterial Scaffolds: Recent Advances and Challenges" organized by St. James College of Pharmaceutical Sciences, Chalakudy, sponsored by Kerala State Council for Science, Technology and Environment, Thiruvananthapuram, on 29th March 2017.

Mr. Surendiran N S, Asst. Professor, participated in the National Conference on "Current Perspectives in Novel Drug Delivery Systems" organized by PSG College of Pharmacy, Coimbatore, which is co-sponsored by DST, ICMR & INSA, on 16th & 17th June 2017.

Mr. Surendiran N S, Asst. Professor, participated as delegate in the National Seminar on "Neuro De-Generative Diseases: Current and Future Perspectives " organized by Karpakam College of Pharmacy, Coimbatore, which is co-sponsored by The Tamil Nadu Dr. MGR Medical University, on 30th June 2017.

POSTER PRESENTATIONS

Our students were presented the research papers in the National Level symposium on "Biomaterial Scaffolds: Recent Advances and Challenges" organized by St. James College of Pharmaceutical Sciences, Chalakudy, sponsored by Kerala State Council for Science, Technology and Environment, Thiruvananthapuram, held on 29th March 2017.

A snap shot of Poster Presentation



Mr. Binulal (II. M. Pharm)



Mrs. Sunusha E (II. M. Pharm)

FACULTY ACHIEVEMENTS

Mr. Surendiran N S, Asst. Professor, has successfully submitted his Ph.D thesis to Shri Jagadish Prasad Jhabarmal Tibrewala University, Jhunjhunu, Rajasthan.



INDUSTRIAL TRAINING

Our relation with Pharmaceutical Industry and research organization are unique. Our PG Students have successfully completed an industrial training from Karnataka Antibiotics & Pharmaceutical Ltd, & Recipharm Pharma services Pvt. Ltd, Bangalore. During this training, the students were interacted well with the industry personnel's and gained some practical exposure in the areas of Formulation plant includes Parenteral, Non-Parenteral, Engineering & Maintenance Department, Store & Quality assurance departments. The Industrial training proved to be great learning and fruitful experience for the students and gave them better exposure.

A snap shot of Industrial Training



Mr. Binulal C (II. M. Pharm)
(From 08th - 12th May 2017)



Ms. Neema K. Ramesh & Ms Swetha S (I. M. Pharm)
(From 12th - 17th June 2017)

PHARMA ARTICLES

NEEDLE FREE INJECTION SYSTEM : A BIG CHALLENGE FOR DRUG DELIVERY

Prof. Dr. R. Nethaji, Dept. of Pharmaceutics

The term needle free is used to describe an extensive range of drug delivery systems, which consists of technologies that do not have a needle but make use of electrophoresis to drive drugs through the skin. Needle free devices can take the form of power sprays, edible products, inhalers, and skin patches. Devices are available in reusable and disposable forms, for home or office, and also in versions for multiple patients and institutional uses. This technology avoids various disadvantages that are associated with needle use:

- The risk of cross contamination from needle stick injury
- Under or overdosing which results in poor injection technique in patients
- Needle phobia & Injection site pain
- Poor compliance resulting in long term worsening of conditions
- Increased costs due to patients visiting the hospitals for injections

Needle free technology (Jet injectors), were developed in the 1930s and used widely over 50 years in mass vaccination programs in patients suffering from smallpox, polio and measles. Mechanical compression is used to force (generated by a compressed gas typically air, CO₂ or nitrogen) fluid through a small orifice, these devices created a high pressure stream that could easily penetrate the skin, subcutaneous tissue and underlying shallow muscle in order to deliver the vaccine in a fraction of a second. One major problem to needle free injections has been the wetness related with residual vaccine on the skin surface. It has been designed to deliver antibiotics, iron dextran/vaccines comfortably, accurately, easily and rapidly without the application of a needle. There are 3 stages in needle free delivery: **Stage 1**, the peak pressure phase, in which optimal pressure is used to penetrate the skin (< 0.025 sec); **Stage 2**, the delivery or dispersion phase (~ 0.2 sec); and **Stage 3**, the drop-off phase (< 0.05 sec).

Types of Needle free technologies

Powder Injections: For the purpose of delivery via skin, the particles must only pierce the outermost barrier of the skin and drugs delivered reach the circulatory system at a faster rate and the energy generated by a transient gas jet is used to accelerate a premeasured dose of particulate drug formulation.

Liquid injections: The basic principle is a high enough pressure is generated by a fluid, and then the liquid will punch a hole into the skin and will be delivered into the tissues in and under the skin.

Depot injections: These are given in the muscle, where they create a depot of a drug that is released continuously over a specified period of time.

Components of Needle free technologies

Nozzle: It acts as the passage for the drug and as the surface which contacts the skin. The nozzle contains a flat surface and an orifice. The nozzle provides the surface which comes in contact with the skin and the orifice which the drug passes through when injected. The orifice controls the drug stream diameter and speed. A stream diameter of approximately 100 μm and traveling at 100 m/s can achieve the desired injection depth of 2mm.

Drug reservoir: The drug volume holds the injection fluid inside the device.

Pressure source: The energy source provides the essential driving energy to the drug for injection. Many of the devices in the market use either mechanical or stored pressure as energy storage elements. The mechanical method stores energy in a spring which is released by pushing a plunger to provide the necessary pressure. The pressure storage method uses compressed gas in a vessel which is released at the time of injection.

Types of Needle free injection devices

Spring-Powered: Compact and lower cost, but suffer from limited range of force and reduced versatility. Spring-powered devices have been primarily used for subcutaneous administration of drugs.

Compressed Gas-Powered: Sustained force of generation, greater flexibility, and the ability to deliver larger volumes.

Different Technologies

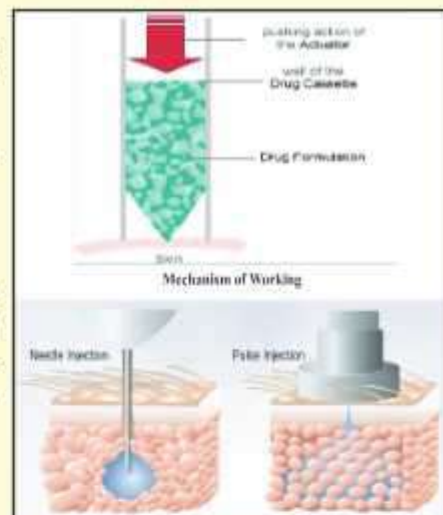
Bioject's needle free injection technology, Biojector 2000, Vitajet 3, Cool click, SeroJet, Iject, Biovalve's Mini-Ject technology, Antares' Medi-Jector Vision technology, Implaject, Crossject, Powderject, Zoma-jet 2 Vision, Valeo (MJ8), SQ-PEN technology.

Drugs used in Needle free injection technology

Insulin, Human growth hormone, Erythropoietin, MAB's (Monoclonal antibodies), Vaccines for hepatitis, yellow fever, influenza, Vaccines for measles, mumps, diphtheria, rubella, tetanus, etc. Heparin, Morphine, Lidocaine, α-interferon and γ-interferon.

Current Needle free injection Devices

Device	Company	Power Source	Descriptions
PowderJect	Algorx	Helium	Delivery of DNA Vaccines
Mediject	Antares	Metalsprings	Chronic dosing devices
Intraject	Aradigm	Compressed nitrogen gas	Chronic dosing devices
Miniject	BioValve	Chemical gas generation	Single use disposable device
Pen jet	VMPC	Compressed gas	Single use disposable device
J-Tip	NMP	Carbon dic oxide	Disposable needle free injector
Iject	Bioject	Compressed gas	Single use Prefilled syringe



Applications

- Mass immunizations such as measles, smallpox.
- Intraject (Weston medical) technology is used to deliver drugs which consist of proteins, peptides, monoclonal antibodies, small molecules and vaccines.
- Powderject (Powderject pharmaceuticals) technology is used to deliver inulin to hairless guinea pigs, delivery of large macromolecules across the skin, for intradermal DNA immunization against influenza virus in mice.
- Jet injector's technology delivers proteins such as β -interferon as well as small organic conventional therapeutic agents such as lidocaine (lignocaine) for local anaesthesia.
- The Disposable Syringe Jet Injector (DSJI) Project is supporting clinical research on the delivery of vaccines with jet injectors.

Conclusion

Needle free technology offers the advantage of reducing the pain on injection. Additionally it is a rapid method of delivery and requires no disposal of sharps. It has resulted in an increased patient compliance and increased product sales for the industry. Further the risk of the transmission of disease via the needles is eliminated. This type of delivery is a potential boom for the protein and peptide based therapeutics. There appears to be a tremendous opportunity for needle free injection technology. Needle free devices have shown an effective delivery to the epidermis, dermis, subcutaneous layer and the intramuscular space. The technology offers a wide variety of devices for different applications which cover chronic dosing as in case of insulin injections to the once a week delivery of small dose MABS and other therapeutic proteins.

Future Scope

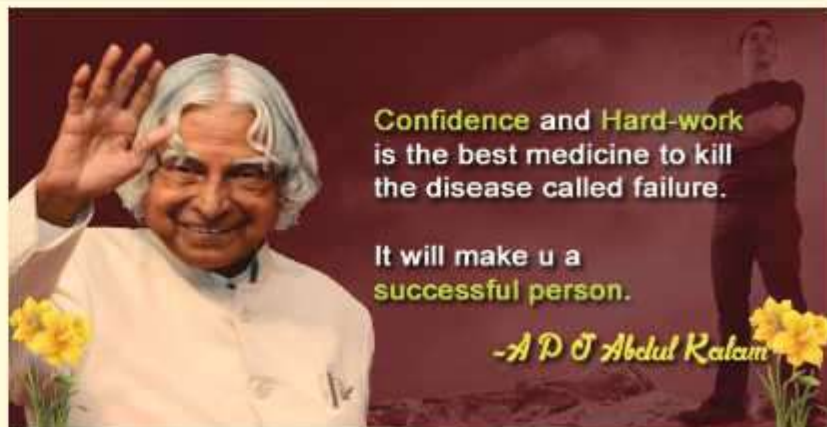
Despite the advances in technology and the continuous research in this field, many of the needle free devices are still in the development stages. Companies are still working on producing devices that are safer and easier to use. Work needs to be done in order to deliver more drugs by this system. The technology can be extended to nasal sprays, air injectors and transdermal patches. The sustained and controlled drug delivery techniques can be synchronized with the needle free technology to further reduce the dosage of drugs. Development in this field of projectile based needle free injection technology is a promising prospect of the novel drug delivery.

UPCOMING PHARMA EVENTS.....

- ⇒ 9th Indian Pharmaceutical Association (IPA) Students Congress, on 1st-2nd, September 2017, at Rajahmundry, Andhra Pradesh.
- ⇒ Bio Pharma India 2017, on 19th-20th, September 2017, at Mumbai.
- ⇒ World Congress on Pharmaceutical Sciences, on 5th-7th, October 2017, at Goa.
- ⇒ CHEMTECH - South World Expo 2017, on 13th-15th, December 2017, at Hitex Exhibition Centre, Hyderabad.

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