Faculty of Pharmacy

RAMAIAH UNIVERSITY OF APPLIED SCIENCES

ज्ञानं विज्ञानं च भक्तिसहितं

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October - December 2022

SCINTILLA

QUARTERLY E-NEWS LETTER

DEPARTMENT OF PHARMACEUTICS

http://www.msruas.ac.in/academics/pharmacy

SCINTILLA

QUARTERLY E-NEWS LETTER

Scintilla is the quarterly E-news letter of Department of Pharmaceutics, FPH, RUAS which seeks to provide to world outside, News, Views, and Creative expressions from the members of the department. Scintilla comes directly from Latin, where it carries the meaning of "spark" - that is, a bright flash such as you might see from a burning ember or spark of specified quality or feeling, which is almost synonymous to department's intent, hence the name SCINTILLA

EDITORIAL BOARD

EDITORIAL

Lovely Readers!!!

Fantastic vibes for a fantastic mind and body.

*Once again the editorial team is extremely happy in offering the next edition of **Scintilla** to all the prolific readers and patrons. The progress and developments made by the department in the last three months have been captured and rolled out for the benefit of readers.*

This edition has an ample coverage on the latest advancements in pharmaceutical technologies blended with brief profile on the academic activities and achievements of department staff members in various domains. Congratulations to the editorial team for putting forth a better compilation and releasing this issue.
The editorial board, of late, is pondering on the feasibility and relevance of inviting lofty scientific articles from external experts from different sectors for the intellectual benefits of the students and staff. I appeal to all the member of the editorial board to align in this direction to seek articles from stalwarts. It is a priority for the department not to miss a beat when it comes to motivating both undergraduate and graduate students to participate actively in the knowledge acquisition and dissemination process, especially when it comes to adding more glamour and charm to the editions of Scintilla
*Special appreciation to the **Ms.Bhavana**, **Ms. Akshitha & Ms.Anuhya**, winners of best article of the previous edition, and **Ms. Simran Sahani** for winning the puzzle punch. We wish to receive such a heartwarming response from all the stake holders for the strengthening of this e news letter.*

The theme for the next issue of Scintilla will be on the emerging concepts in the pharmaceutical sector for better health delivery. I earnestly appeal and optimistic enough to await favorable response from the readers.

At last, please remember the best time to plant a sapling is now. GET STARTED; In closing, I would like all of you to ponder two beautiful thoughts:
Focus on where you want to go; not on what you FEAR.

Never be a prisoner of your past. It's a lesson not a life sentence.

Stay Safe and Take Care....

Chief Editor

Dr. S. Bharath
Chief Editor

For any further queries and suggestions contact :

Dr. Sharon Caroline Furtado

sharoncaroline.ps.ph@msruas.ac.in

080-23608942

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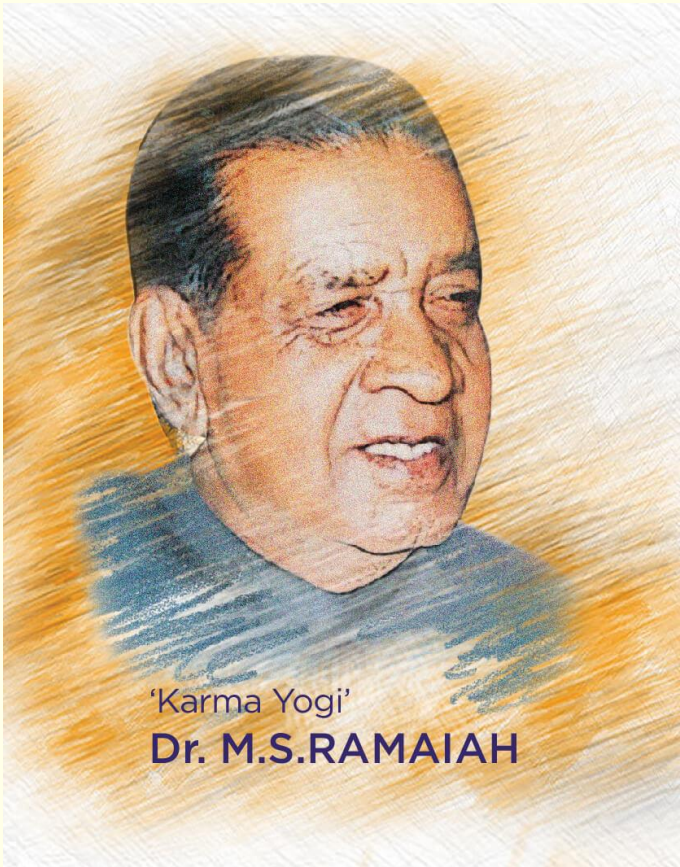


Celebrating the

100th Birth Anniversary of Dr. M.S. Ramaiah

1922-2022

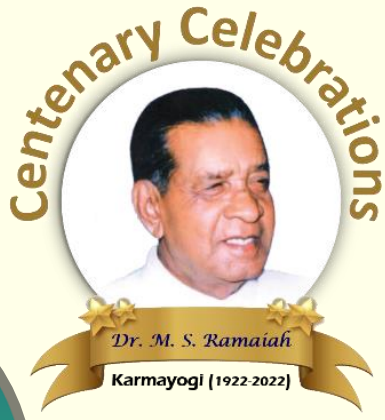
A great visionary, who saw the distant future & achieved the impossible

Visionary Ideas **that transformed** millions **of lives**

On the birthday centenary of our visionary founder, Dr. M.S. Ramaiah, we pledge to continue to work towards transforming the lives of our fellow citizens. We are indebted to you, forever.

Postage Stamp to commemorate the birth centenary of Dr. M.S Ramaiah released on 22-04-2022

SCINTILLA



2022

Centenary celebration of

Karmayogi

Dr. M S Ramaiah

1999 - 2010

- **1999 –** MSR School of Advanced studies
- **2004 –** MSR college of education
- **2006 –** MSR International medical school

1991 - 1993

- **1991 – MSR Dental college**
- **1992 – MSR college of pharmacy**
- **1993 – MSR common junior college**

1971 - 1980

- **Establishment of MSR medical college**

1922

Birth of

Sri. Mathikere Sampangi Ramaiah

2011 - 2020

- **2012 –** MSR Advanced learning center
- **2013 – MSR University of applied sciences**
- **2014 –** Hon. Doc from VTU awarded to MS Ramaiah Posthumously

1994 - 1997

- **1994 –** MSR Arts, Science and commerce college
- **1995 –** MSR institute of management
- **1997 –** MSR Polytechnic school

1981 - 1990

- **1985 –** MSR Teaching hospital
- **1987 –** MSR Institute of nursing education and research

1951 - 1970

- **1956 –** Acquired Thainadu daily
- **1962 –** Gokula education foundation, marking beginning of MSRIT

DEPARTMENTAL PRIDE

Publications

- K.Bhagyasree, **Dhrubojyoti Mukherjee**, Mohammad Azamthulla, Shouvik Debnath, Lakshmi M. Sundar, Sahana Hulikal, Banala Venkatesh Teja, Shvetank Bhatt, Devanand Kamnoore (2022) Thiolated sodium alginate/polyethylene glycol/hydroxyapatite nanohybrid for bone tissue engineering, Journal of Drug Delivery Science and Technology, October 2022, pp. 103813
- Mullick P, **R Hegde A**, Gopalan D, Pandey A, Nandakumar K, Jain S, Kuppusamy G, Mutalik S (2022) Evolving Era of "Sponges": Nanosponges as a Versatile Nanocarrier for the Effective Skin Delivery of Drugs. Curr Pharm Des. 28(23, pp. 1885-1896
- Manisha UK, **Tanmoy Ghosh**, Apoorva VP, Divya B, Swathy SP, Ankita Paul, **Basaavraj B V**. Isolation, phytochemical elucidation, and wound healing potential of chitosan-based film loaded with *Tagetes Erecta*. 2022, Materials Today: Proceedings
- Darshan Ramesh, **Sindhu Abraham**, Megha Krishnappa, **Bharath Srinivasan**, Sterile thermoresponsive formulations for emergency management of burns, Materials Today: Proceedings, 2022

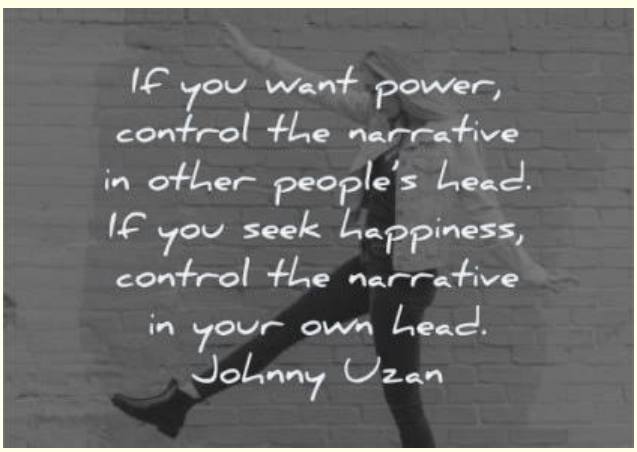
Book Chapters

- Venkatesh Teja Banala, **Dhrubojyoti Mukherjee**, Pankaj Kumar Singh (2022) Current status of FDA-approved marketed nano drug products: regulatory considerations, Multifunctional Nanocarriers (Micro & nano Technologies Series, Elsevier), pp.501-52
- **Ghosh T**, **Deveswaran, R.**, **Bharath, S**. Green materials for wound healing. Encyclopedia of Green Materials (2022). Springer Singapore

DEPARTMENTAL PRIDE

Conference Presentations

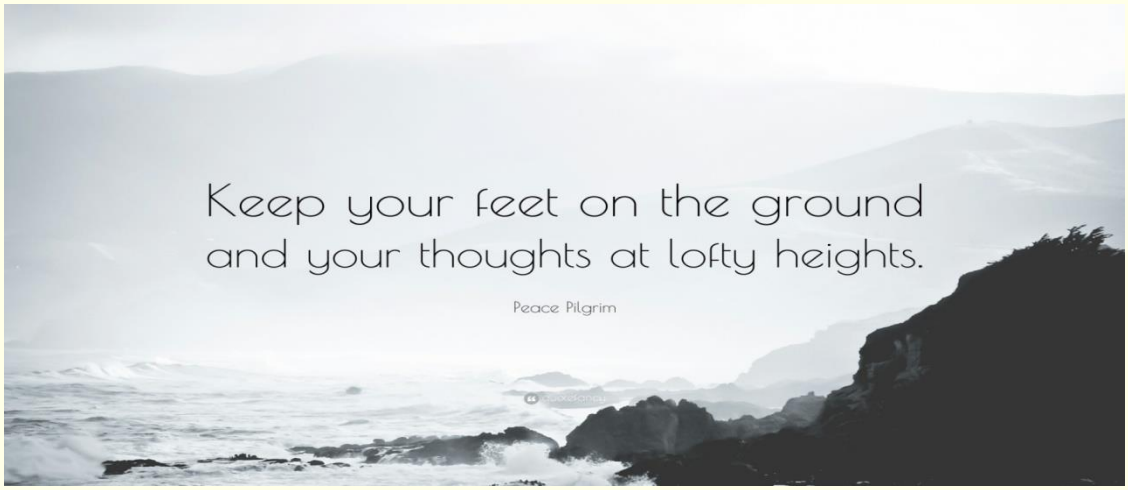
- Chaitra Shree T.J, **Sindhu Abraham**, Kesha Desai, **Sharon Furtado** and **Bharath Srinivasan** (2022) Nano Calcium Incorporated Piscean Collagen Scaffolds as Wound Dressing Materials, Proceedings at APA Bioforum 2022 International e- Conference on Biopolymers, pp. 171
- Megha K., Darshan R., **Sindhu Abraham** and **Bharath Srinivasan** (2022) Sterile Thermo-Responsive Formulations for Emergency Management of Burns, Proceedings at APA Bioforum 2022 International e- Conference on Biopolymers, pp. 144
- Sandhyashree S.B., Neelamma, **Sindhu Abraham** and **Bharath Srinivasan** (2022) Tea tree Oil Nail Lacquer for Treatment of Paronychia, Proceedings at APA Bioforum 2022 International e- Conference on Biopolymers, pp. 145
- **Shwetha. K**, **Basavaraj. B.V** and **Bharath. S** (2022) Microwave Assisted Vanillin Crosslinked Chitosan/Polycarbophil Superporous Hydrogels for Biomedical Application: Optimization and Characterization, Proceedings at International e conference on Biopolymers, APA Bioforum, pp. 78



DEPARTMENTAL PRIDE

Conference Presentations

- **Sharon CF**., **Bharath S**., Anbu J., and **Sindhu A**. (2022) Lyophilized Biocomposite Chitin-Alginate Matrices for Wound Healing Application, Proceedings at International e_conference on Biopolymers, APA Bioforum, pp. 195
- Puspanjali S., Meghana B.R., **Sharon C. F**. (2022) Egg Shell Membrane Hydrolysate Incorporated Bigels: Potential Anti-Aging Formulation, Proceedings at International e conference on Biopolymers, APA Bioforum, pp. 148
- Aditi Rao, S.Ashwini, **R.Deveswaran**, (2022), Formulation and In-vitro Evaluation of Grape Seed Extract Containing Dentifrice, 2022 Second Global Conference on Recent Advances in Sustainable Materials (GC-RASM 2022) at A.J. Institute of Engineering and Technology, Mangalore, Karnataka, India during 28 - 29, July 2022
- Nausheen Ahmed, **R Deveswaran**, P Parasuraman, **S Bharath**, C.Priyanka, PS Santosh (2022), Topical Delivery of Natural Extract for Accelerated Wound Healing, 2022 Second Global Conference on Recent Advances in Sustainable Materials (GC-RASM 2022) at A.J. Institute of Engineering and Technology, Mangalore, Karnataka, India during 28 - 29, July 2022



DEPARTMENTAL PRIDE

FDP's Attended

Tanmoy Ghosh attended 5 days Faculty Development Program on 'Interdisciplinary Translational Science & Engineering' organized by Centre for Biomaterials, Cellular & Molecular Theranostics (CBCMT) at Vellore Institute of Technology (VIT), Vellore, India, from 18th to 22nd of July 2022

Workshops attended

- **Hegde, Aswathi R**. attended Teachers' skill Empowerment series (TEM-I) on the theme "Make Teaching Effective with Active Learning Methods" held on September 5, 2022 (online mode), organized by Centre for Pharmaceutical Skill Development (CPSD), under the aegis of Manipal College of Pharmaceutical Sciences, Manipal
- **Hegde, Aswathi R**. participated in the 3rd International Workshop "Computational Tools in Drug Design - CTDD" on 22nd and 23rd September 2022, organized by the Department of Pharmaceutical Chemistry, Faculty of Pharmacy, Ramaiah University of Applied Sciences, Bengaluru

Online courses completed

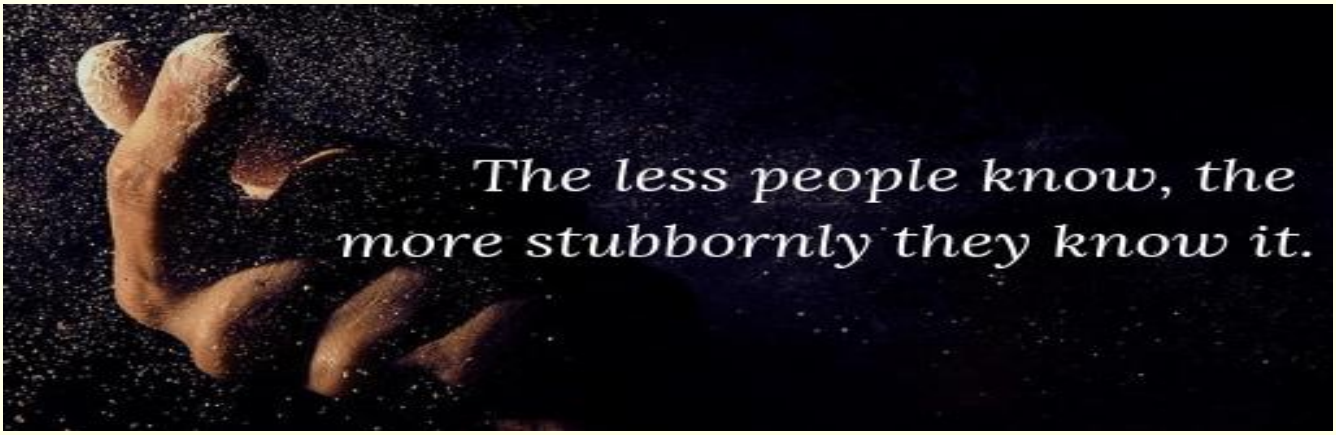
Sharon Caroline Furtado successfully completed Journal Citation Report (JCR) certification series -2022

Awards & Recognitions

Dr. Sindhu Abraham was the recipient of '*Annual Exemplary Teacher Award*' on the occasion of Teacher's Day- September 2022 in recognition of her services rendered to the Faculty and University

Dr. Sindhu Abraham received the Poster Contest Award for the work entitled ' Nano calcium incorporated piscean collagen as wound dressing material' at the International e-conference on Biopolymers, APA Bioforum -2022

Dr. Sharon Caroline Furtado received the Poster Contest Award for the work entitled 'Lyophilized Biocomposite Chitin-Alginate Matrices for wound healing Application' at the International e-conference on Biopolymers, APA Bioforum -2022



Upcoming Events

RAMAIAH UNIVERSITY OF APPLIED SCIENCES Faculty of Pharmacy

INSTITUTION INNOVATION COUNCIL

Drug Design and Development Centre & Department of Pharmaceutics

Conducting

5 day Weekend Workshop on

"Finishing School – Pharmaceutical Industry Orientation"

15th Oct. - 12th Nov. 2022

About the Programme

A finishing course with a blend of interactive sessions from Industrial Experts, Laboratory demonstrations, Hands on training, Industrial visit etc. to make you industry ready and employable.

Salient features of the workshop

- Industry experts covering key topics on latest developments in the Pharmaceutical industry
- Learn on industry trends and opportunities in the pharmaceutical industry
- Prepare the students to be "Industry Ready"
- Finishing course for the students to make them Industry employable
- Resource persons from the pharmaceutical industries briefing on career paths
- Opportunity to interact with the industry experts of different functions
- Helps the students to decide on their career path

Seminar Sessions

Date	Session Topic
15.10.22	Overview of Domestic & Global Pharmaceutical Industry
22.10.22	Pharmacovigilance and Clinical Trials
29.10.22	**Visit to Pharmaceutical Company**
05.11.22	Opportunities in Pharma Marketing
12.11.22	Importance of career planning and Soft Skills in pursuing a right career

Hands on Training

Demonstration/training of sophisticated instruments & equipment

Drug design software

About MS Ramaiah University of Applied Sciences, Bangalore

Ramaiah University of Applied Sciences (RUAS) is a private university established by an Act of the State of Karnataka, India sponsored by Gokula Education Foundation. Ramaiah University is an innovation University that focuses on UG and PG education, research, Consultancy, training, skill and leadership development and offers outcome based UG and PG programs in Medical, Paramedical, Pharmacy, Engineering, Life & Allied Sciences, Law, Management & Commerce and Hospitality. MSRUAS focuses on student centric professional education and services with applied research whilst maintaining the highest academic and ethical standards in a creative and innovative environment.

Faculty of Pharmacy

The Faculty of Pharmacy (FPH) formerly, M.S. Ramaiah College of Pharmacy was established in 1992. and is ranked 62nd AIR in the NIRF ranking 2022. The Faculty of Pharmacy, a leading Pharmacy college in India, imparts quality pharmaceutical education to meet the growing demands of well-trained health professionals in our country. The faculty offers a 4-year undergraduate programme leading to the Bachelor of Pharmacy degree (B.Pharm), 2-year Postgraduate programmes in Pharmacognosy, Pharmaceutical Chemistry, Pharmacology, Pharmaceutics and Pharmacy Practice leading to Master of Pharmacy degree (M. Pharm), 6-year Doctor of Pharmacy degree (Pharm D) and also full-time and part-time Doctoral research programme (Ph.D).

About Drug Design and Development Centre (DDDC)

Drug Design and Development Centre is a research group of involved in the design and development of novel drug delivery systems adhering to the required norms of contemporary medical treatment modalities. The Centre imparts practical training on various concepts and good practices of pharmaceutical sciences. Various joint initiatives for industrial collaboration and partnership with Universities, Research centers and Industries are the key roles of DDDC

Course delivery: Sessions on Saturdays for 5 weeks

Programme Fee: Rs.2500/- (inclusive of GST)

Register through the below mentioned link

https://ruasportal.msruas.ac.in/asd_EventPublicUserMaster.htm?eventID=13

Who should attend?

UG/PG students in the domain of Pharmacy, B.Sc. Biotechnology and Life Sciences, Dental and Medical Sciences, Pharma Business Management & Ph.D scholars

Convener

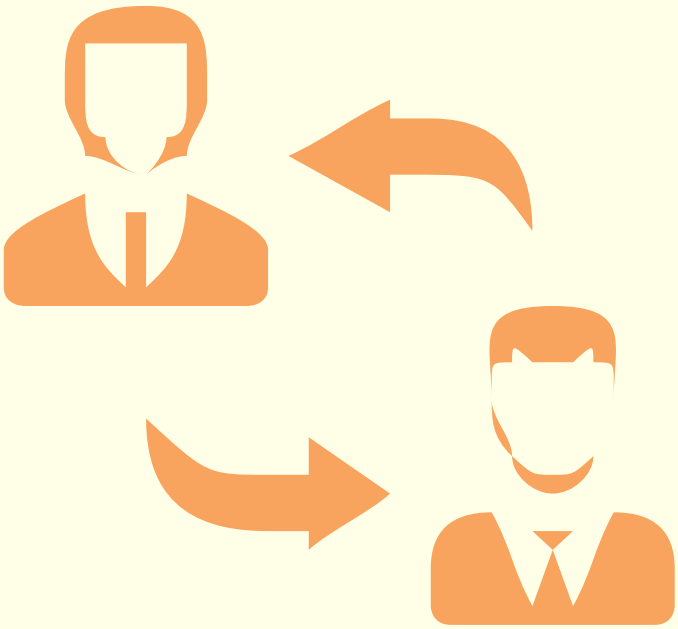
Dr.S.Bharath
Dean, FPH, RUAS

Coordinators

Dr. R. Deveswaran
Head-DDDC
Mob: 9880238650
deveswaran.ps.ph@msruas.ac.in

Dr. Sandhya KV
Associate Head-DDDC
Mobile:9448017063
sandhya.ps.ph@msruas.ac.in

A unique blend of interactive sessions from industrial experts, laboratory demonstrations, hands on training and industrial visit



Upcoming Events

PG Alumni Meghana B R, currently working as a research associate in Jubiliant Biosciences Ltd., will be delivering an Alumni talk on 'A Brief Introduction to DMPK and Research in R & D – An Actual Picture'

Dr. Sangamesh Puranik, Founder and CEO, Masanga Laboratories will be delivering a guest lecture on 'Nutraceuticals and Superfoods'. Dr. Puranik has a vast experience in various fields of Pharma, Food Quality and Regulatory Affairs.

ACELLULAR DERMAL MATRIX – AN EMERGING TREND IN TISSUE ENGINEERING

Ms. Shwetha Jain
I M Pharm

Extracellular matrix is a three-dimensional network consisting of extracellular molecules and minerals such as collagen, enzymes, glycoproteins, hydroxyapatite, that provide structural and biochemical support to surrounding cells.

Ever heard about a scaffold that adhere to skin?

The recent development in the pharma field linked with various technology and creativity has made it possible to develop a "structural scaffold that directs cell adhesion, migration, regulating cellular growth" which is named as an **ACELLULAR DERMAL MATRIX.**

Acellular Dermal Matrix (ADM), a type of surgical mesh, is developed from human skin (such as FlexHD, AlloMax, AlloDerm) or animal skin (such as SurgiMend), in which the cells are removed and the support structure is left in place. Some ADMs have been cleared by the FDA for use in certain types of surgeries, such as in hernia surgery, to reinforce tissue where weakness exists

Acellular dermal matrices are generated by decellularization process, which leads to the removal of the cells and preserving of the extracellular matrix

The design and composition of ECM in tissue is unique thereby defining the functionality of the tissue.

The ECM scaffolds promote the formation of site appropriate tissue at the site of implantation which helps in revascularization, in turn generate a new tissue

Steps involved in processing of ADM's include

1.Decellularization
2. Crosslinking
3. Preservation
4. Sterilization

Decellularization

Decellularization refers to the process of treating a tissue with any combination of physical stress and chemical/enzymatic agents to remove cellular components, leaving behind only the noncellular ECM that can be used for therapeutic applications.

The specific method of decellularization used depends on the tissue type; for instance, while cartilage tissue is able to undergo a relatively harsh treatment, lung tissue requires a more sensitive decellularization method to preserve its tissue composition.

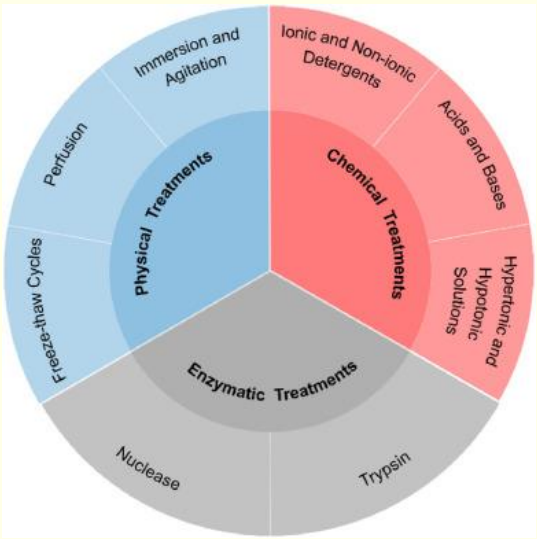


Fig. 1: Decellularization techniques

With proper decellularization, the complex biomolecular and physical cues in the ECM are preserved and can support cell growth and viability.

Once formed, these matrices are preserved using following methods:

1. *Physical methods*

a. Freezing at -4 to -10°C

b. Cryopreservation -80 to -100°C

c. Lyophilization

2. *Chemical methods*

a. Storage of tissues in aqueous alcohols or antioxidants

Sterility assurance of these matrices is of prime importance. The matrices may be terminally sterilized using physical techniques (gamma radiations, E-beam radiation, ethylene oxide) or chemicals (alcohols, hydrogen peroxide, peracetic acid).

Alternatively, the matrices may be processed aseptically as per the procedure outlined in current Good Tissue Practice and additional requirements for manufacturers of HCT/Ps.

Evaluation of ADM's

There are no formal criteria by FDA to evaluate acellular matrix, the following have been used

- The absence of nuclei based upon histologic staining with Hematoxylin and eosin and DAPI
- Quantitative measurement of DNA at less than 50 ng/mg dry tissue weight is acceptable
- DNA fragment size below 200 bp

Biological response of ADMs

The processing techniques used to produce an ADM ultimately dictate the response post-implantation.

These biological responses can be categorized as Non-incorporation or Incorporation (Fig. 2).

A non-incorporation response is one in which cells are unable to penetrate the material and detect the implant as a foreign object.

This leads to a heavy collection of inflammatory cells around the implant periphery and the deposition of a layer of dense connective tissue encapsulating the implant.

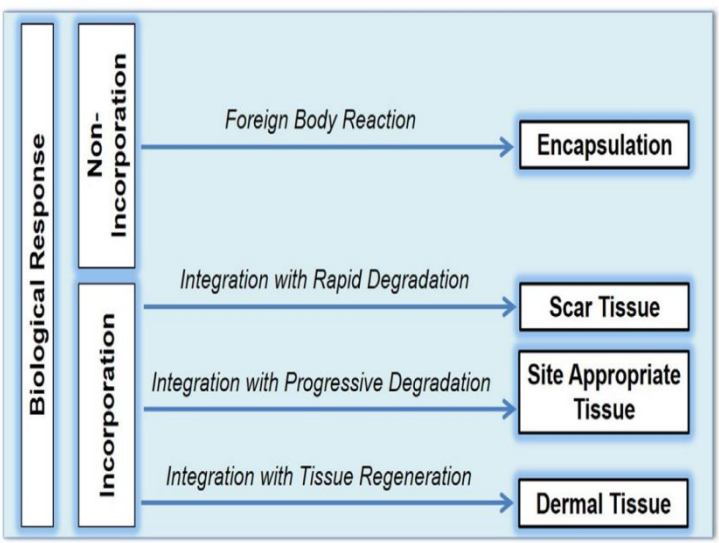
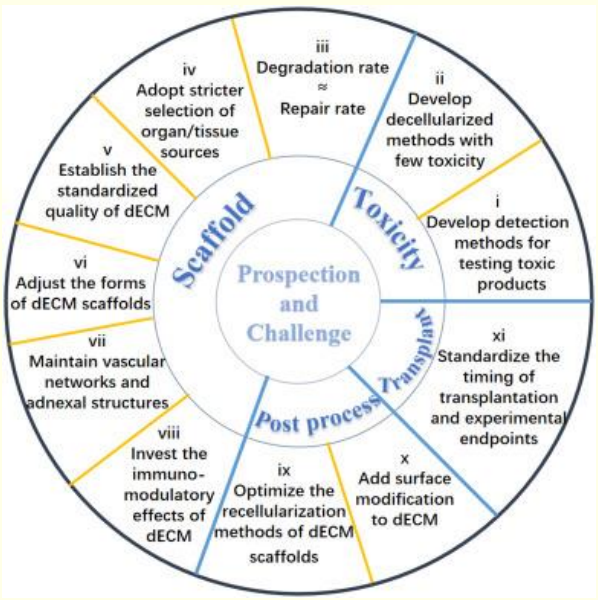


Fig.2: Biological response of ADM's

An incorporation response is one in which cells can penetrate the matrix and based on levels of inflammatory response and rate of matrix degradation can lead to scar tissue formation, site appropriate tissue deposition, or dermal tissue generation.



There are, however, limitations to the use of ADM in standard clinical treatments. First, there are significantly different reported methods of ADM tissue processing. With individual studies exploring different combinations of decellularization methods and following flexible guidelines, it is difficult to draw conclusions on which method is best for a specific application. Additional guidelines that not only discuss the removal of nuclear material but also the retention of ECM molecules would contribute greatly to standardized decellularization procedures.

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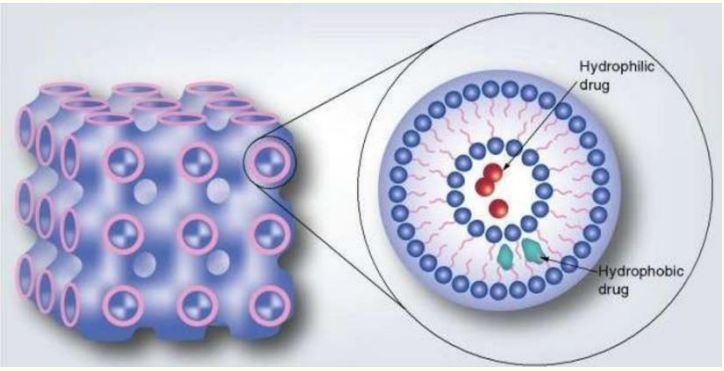
CUBOSOMES – A NOVEL 3D NANOSTRUCTURE

Ms. Shwetha Singh
I M Pharm

Cubosomes are discrete, sub-micron, nanostructured particles of the bicontinuous cubic liquid crystalline phase. The term "bicontinuous" refers to two distinct hydrophilic regions separated by the bilayer. Bicontinuous cubic crystalline materials have been an active research topic because their structure lends itself well to controlled-release applications.

Cubosomes are liquid crystalline nano-structures formed from the cubic phase of lipids, such as monooleate, or any other amphiphilic macromolecules with the unique property to be dispersed into particles. Nano-vehicles are generated from a self-assembled lipid mixture and studied by means of high-resolution cryogenic transmission electron microscope (cryo-TEM). These structures have been observed to naturally occur in mitochondrial membranes and in stressed cells.

Cubosomes are formed at controlled temperatures into lipid bi-layer twisted into three dimensions with minimal surface forming a tightly packed structure with bi-continuous domains of water and lipid. There are three different proposed phases that these cubic structures can be in: the P-surface, G-surface and D-surface for primitive, gyroid and diamond structures respectively. This variation in structure allows for cubosomes to be the ultimate drug delivery system due to its ability to maintain the structural integrity of the ingredients that it carries. The uses of cubosomes are still being researched but they range from systems for efficient drug delivery into specific body systems to stabilizing and producing palladium nanoparticles. These properties are due to the formation of a lipid bi-layer.



For most fluids and some homogenous solid materials, like gels, diffusion is the same in all directions and characterized by the same diffusion coefficient number. This property is called isotropicity which gives cubosomes the ability to be used in biological tissues which are highly structured and typically have different diffusion coefficients along different directions (anisotropic). Because of advantages such as the unique structure of the cubic phase and its resemblance to biological membranes as well as biodegradability of lipids, cubosomes are a great tool for drug delivery system. In addition, the bicontinuous cubic liquid crystalline phase (cubic phase)'s tortuosity is useful for slowing down diffusion as shown by Higuchi's square root of time release kinetics. Capability to encapsulate hydrophilic, hydrophobic, and amphiphilic substance, being simple to prepare, and all the aforementioned qualities give cubosomes a property that can be used in controlled transport applications as drug delivery vehicles. Thus, these systems can be used to incorporate liquid crystals for biomedical application.

Methods of Cubosome formation

There are a number of methods for cubosome formation including dispersion of bulk cubic phases using sonication, homogenization, shearing, solvent evaporation, the incorporation of hydrotopes which enable formation via a dilution method and (less commonly) using mechanical stirring.

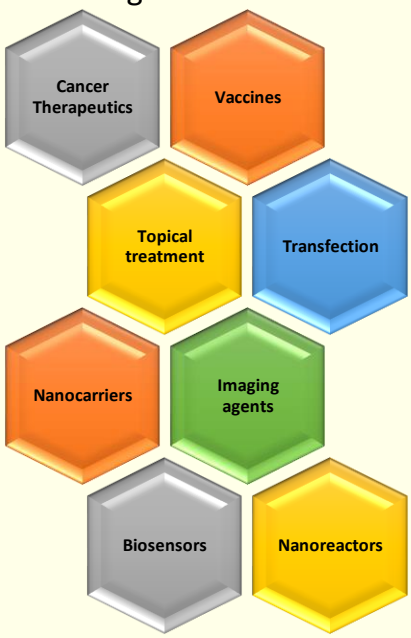


Fig. 2: Some Applications of Cubosomes

Recent advances have now enabled the rational design of smart cubosome systems for diverse applications. As the fundamental knowledge base expands cubosomes are evolving into the next generation of smart lipid nanoparticles.

References

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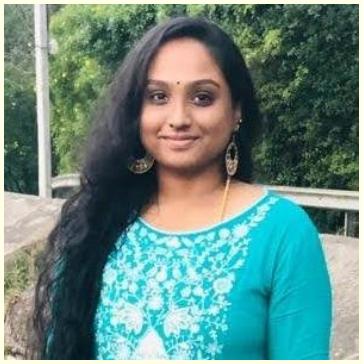
2. Karami, Z. and Hamidi, M. (2016) 'Cubosomes: remarkable drug delivery potential', Drug Discovery Today, 21(5), pp. 789–801.

MOSQUITO-BASED BIOMATERIALS & MEDICAL DEVICES



Ms. Shruthi M
I M Pharm

Predatory mosquitoes that select humans to feed on have gained notoriety as a bane to human existence. Mosquitoes are known to spread pathogens that cause devastating human diseases, such as Malaria, Yellow fever, and Zika fever. In 2018, mosquito related diseases were estimated to account for 17% of the global burden of infectious diseases for both morbidity and mortality. Despite their deadly predatory behaviours, science has now uncovered how mosquitoes can be beneficial for the development of an assortment of medical technologies Elements isolated or mimicked from the mosquitoes can provide a source of biomaterials and guide the development of medical devices. With procreation being imperative for the survival of mosquito species, female mosquitoes use blood meals as a rich source of proteins and other nutrients for their eggs.

Blood-sucking mosquitoes lunge their needle-like proboscis from their mouth deep into the vasculature network within the skin of the host. To counteract the innate processes that prevent blood leakage from the host, mosquitoes apply their saliva at the injury site. Their saliva contains biological agents that inhibit blood clotting and platelet aggregation, like heparin and anti-thrombin, allowing uninhibited blood flow and attenuated clotting in lacerated vessels.

A host of anti-haemostatic proteins can be extracted from mosquito saliva, and they are prospective candidates for integration into biomaterial coatings to prevent the thrombosis associated with implantation of medical devices. Additionally, the blood-drawing apparatus of mosquitoes has been replicated in the design of microneedles and other skin-penetrating medical devices to reduce the pain associated with piercing human skin.

Other features of mosquitoes have given rise to elastic proteins, superhydrophobic materials, and olfactory sensors, adding to the arsenal of mosquito-enabled tools that can be exploited to enhance human health. Similar to many other insects, mosquitoes provide a unique framework, with their internal protein composition and external microstructural features, upon which unique biomaterials and medical devices can be built.

Due to the stealthy biting tactics that mosquitoes employ, most human victims are not aware of the mosquito's biting action until the blood-drawing process has been completed. Using this covert mechanism of blood extraction, scientists have created painless microneedles to administer drugs and treatments more efficiently via a transdermal route.

This can also help to decrease pain perception in patients, thus improving patient compliance. The complicated shapes allows for more diffused stress distribution, allowing for easier skin penetration.

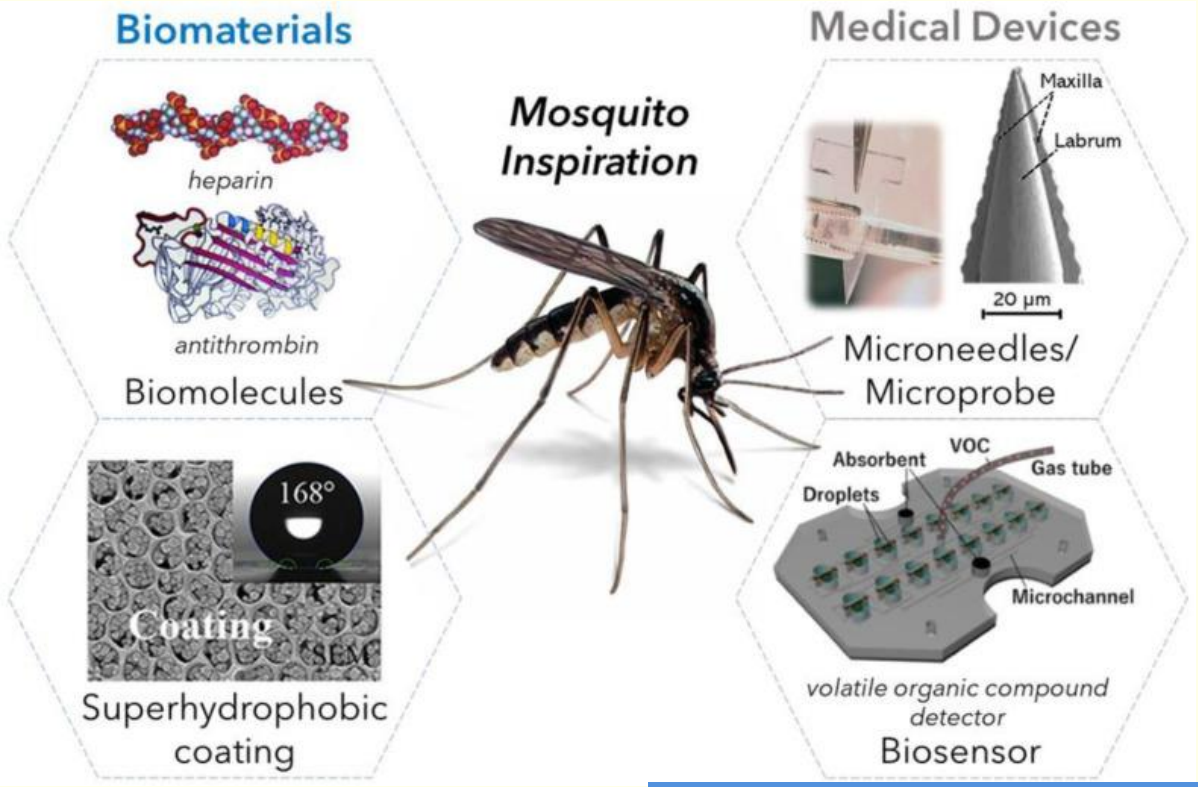
Anopheline antiplatelet protein (AAPP), CPP protein (derived from Culex pipiens pallens), Aegyptin, hamadarin, and even heparin itself are all biological molecules contained in the saliva of different mosquito species that aid in the ingestion of a blood meal by interfering with the host clotting. Thus, they can have varied biomedical applications as clot busters.

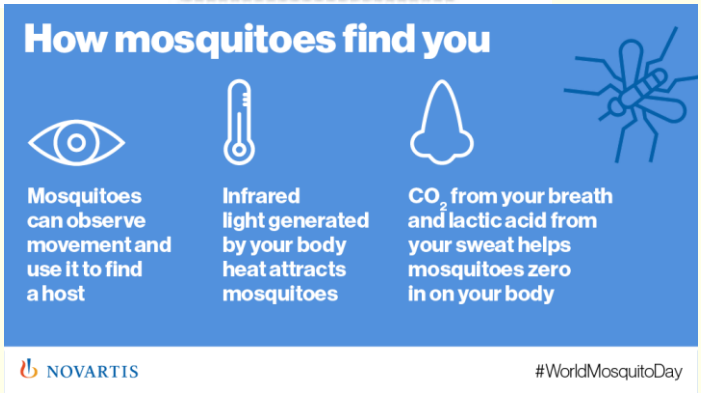
Resilin is an integral protein present in many parts of the mosquito that allows for its flight and ability to resist stress from its environment. Resilin and resilin-like proteins (RLPs) are actively being used and investigated for many tissue engineering applications to create elastic tissue scaffolds for the repair of damaged vasculature, tendons, and vocal folds.

The micro- and nanostructure of mosquito eyes gives rise to a superhydrophobic trait that helps them see clearly while navigating and enduring the damp and humid environments required for breeding. Researchers have created superhydrophobic surfaces that mimic mosquito corneal surfaces, and these materials may have potential biomedical applications. For example, the integration of superhydrophobic coatings into biomaterials may aid in controlling the protein adsorption, cellular interaction, and bacterial growth that can result from body–material contact.

The fine-tuned mosquito olfactory nervous system has inspired the design of sensors for diagnostic tests that can be performed using Volatile Olfactory receptors for substances like octanol, used as unique biomarkers for use in disease detection. Mosquitoes possess multiple different properties that researchers are learning to harness in the development of advanced technologies for the benefit of human health.

The existing and prospective mosquito-based biomedical technologies presented here are relatively new and novel. It is possible that many other mosquito features have yet to be discovered and evaluated for their potential to solve the current problems and inefficiencies in treating and diagnosing patients.





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PERSONALIZED DRUG DELIVERY SYSTEM– A NEW & BETTER APPROACH TO HEALTHCARE

Ms. Manisha U Kunder & Ms. Megha N
I M Pharm

One of the challenges in healthcare is providing an appropriate medication in the right dose to the patients. As the drug release profile, the absorption, weight and the genetic makeup vary from patient to patient, it is bit difficult to provide accurate dosing to an individual. Improper dosing is the primary reason for 80% of side effect occurring in human and animal. It is important to understand the reason for this problem. Hence research has innovated a promising technique for providing patients with individualized, meticulously made tablets and lowering the likelihood of adverse effects and optimizing the survival rate, by using Personalized Drug Delivery System (PDDS) and Additive Manufacturing (AM).

"PDDS are defined as solid dosage forms containing precise dose of a single or multiple API's And possessing customised appearance that can help in drug identification, solubility, release and monitoring of the treatment"

It is a theory that has the potential to revolutionize medical interventions by offering efficient, individualized therapy solutions based on a patient's genetic, epigenomic, and proteomic profile while also taking into account the patient's special circumstances like way of life, surroundings, weight, sex, age, and other demands.

Benefits: By approving novel therapeutic strategies and changing how people view medicine in the healthcare system, personalized medicine (PM) has the potential to improve medication selection and targeted therapy, increase patient compliance, decrease side effects, change medicine's focus from reaction to prevention, increase cost effectiveness, and boost patient confidence after marketing.

Pharmaceutical Industry related advantages: Due to precise spatial control over the deposition of materials, which limits the amounts of active pharmaceutical ingredient (API) and excipients compared to conventional methods, there is less waste, which lowers the costs of manufacturing and dosing. Shorter transport and storage distances, at lower costs. Due to the ability to quickly make small batches of complicated

formulations with unique geometries and, additionally, the idea of digital dispensing in hard-to-reach locations or developing nations, it is possible to respond quickly and in real time to patient and market needs.

How can one develop personalized medicine ?

"The recently emerged Personalized Drug Delivery System (PDDS) and Additive Manufacturing (AM) which is based on two-dimensional (2D) and three-dimensional (3D) printing techniques."

AM has its own advantages due to its versatile possibility of producing on demand flexible doses, with the help of Additive manufacturing the dose of an individual can be digitally adjusted via Computer Aided Design and the dosage form is printed with the use of various combination of polymeric substance and the APIs.

The first 3D printed drug product developed by Aprecia - Spritam® (generic drug product of Keppra®), containing Anti-Epilepsy drug Levetiracetam, has been approved by the US Food and Drug Administration (FDA) in 2015 and is available on the market

In February 2021, FDA gave the Investigational New Drug (IND) approval for 3D printed drug product T19 by Triastek.

Challenges in personalized medicine - High expense of precision medicine, people worry about genetic discrimination, misunderstanding of genetic and health data, accessibility to genetic testing, and a primary care workforce that isn't particularly well-trained.

Additionally, appropriate regulatory rules relating to the application of this technology in a clinical environment need to be developed. The healthcare system could undergo a transformation due to personalized medicine in the near future.

Applications of personalized medicine

- Based on the individual genetic make-up the dose has been decided due to which the survival rate of the patient is increased
- Implementing precision health approaches will lower medical costs, raise quality of living, & alert people regarding genetic disease.
- Oncology genomics: Comprehensive Genomic Profiling (CGP) for Tumour is a benefit as it aid to identify the best treatment for an individual, identify the hereditary mutation which has a risk of developing to a cancer
- Respiratory proteomics: Proteomics aids in early detection since proteins regulate the body's biological processes, including both health and sickness. Proteomics examines a variety of biological materials, such as serum, blood cells, bronchoalveolar lavage fluids (BAL), nasal lavage fluids (NLF), sputum, and others, in the case of respiratory disease.
- In the treatment of cardiovascular diseases
- In diagnosis of rare genetic diseases

TOOTH TABS

Darshan H R
II M Pharm

Every year billions of toothpaste tubes are made and sold globally? And unfortunately most of those tubes end up in landfills and oceans.

Toothpaste tablets or Toothtabs are regular toothpaste devoid of the water content and compressed into a pill-like shape. They are made using toothpaste formula excluding water. The tablets are placed inside the mouth and chewed, the saliva (or a sip of water) will help to disintegrate them to form a paste followed by brushing with a moist toothbrush.

They share many of the same ingredients as conventional toothpaste available in market, but typical toothpaste also contains water to give it its creamy texture and frequently some kind of preservative, like sodium benzoate or parabens, to prevent the mixture from spoiling. Most liquid mixes containing water require preservative to help stay fresh for longer because liquid may be a source of bacteria and mould. Whereas in the tablet such problems won't occur as they are water free.

There are fluoride-containing and fluoride-free toothpaste tablets available. One of the best ways to improve enamel and prevent cavities and decay is using fluoride. And the approval for fluoride containing toothpaste were given by American dental association. Although the CDC advises individuals to consume tiny doses of fluoride. Numerous kids' products are fluoride-free because studies suggest that children under the age of six may be more susceptible to this harm.

If we decide to use a fluoride-free toothpaste, it's still crucial to practice other good oral hygiene practices, such as eating a low-sugar, low-acid diet, drinking lots of water to retain the pH balance of the saliva, brushing twice daily, and flossing.

Since it first appeared in 1898, tubular toothpaste has been a bit of an environmental catastrophe. “Conventional toothpaste tubes aren’t easy to recycle,” says Dr Sahar Farzadnia from the independent eco-labelling program, Good Environmental Choice Australia. “They’re usually made from different types of plastics, including the cap, and they’re sometimes laminated with a metal layer, which can be another big barrier to recycling. This means tubes can end up in landfill and fragment over time.”

Since toothpaste tablets are created without the use of water, they don't necessarily need preservatives at all. Tablet toothpaste is significantly more stable and also has a longer shelf life than ordinary toothpaste that comes in a tube.

There is a learning curve to like toothpaste tablets since they must be chewed with saliva before turning into a brushable paste. Individuals who have dry mouth may find it especially challenging because they need a lot of saliva to help dissolve the pill into a brush-able form.

Benefits of Toothpaste Tablets

- ✓ **Environmentally-friendly packaging**. Most tablets come in glass or tin containers that are easy to reuse or recycle. Some even come in compostable pouches. All of which help you to reduce the amount of plastic in your home.
- ✓ **Convenient traveling**. Forget about purchasing travel-size toothpaste tubes. Toothpaste tablets are TSA-friendly, so you can bring them along in your carry-on. Plus, they conveniently pack into your work bag or gym duffel for any time you need a quick brush.
- ✓ **Natural ingredients**. Many toothpaste tablet brands prioritize natural ingredients, so you're less likely to find preservatives or parabens. There's also a plethora of gluten-free, vegan, and cruelty-free options to match your lifestyle.

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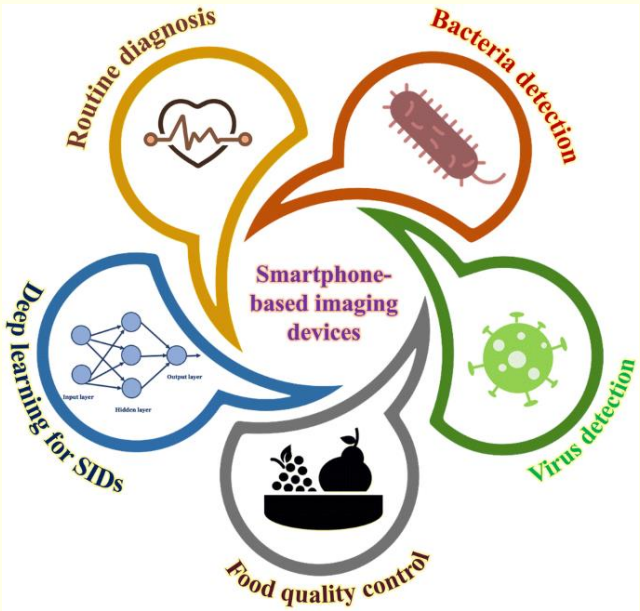
RECENT TRENDS IN SMARTPHONE-BASED IMAGING DEVICES

Spoorthi KS & Raksha CA
I M Pharm

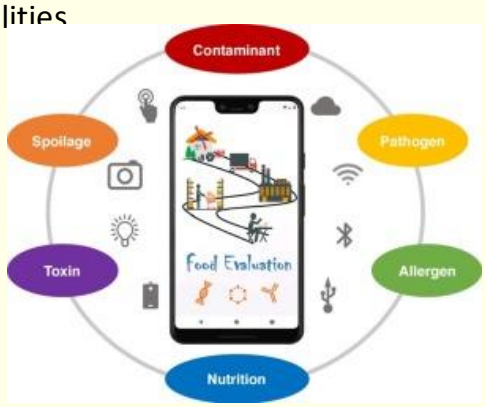
Smartphone-based imaging devices (SIDs) have shown to be versatile and have a wide range of biomedical applications. With the increasing demand for high-quality medical services, technological interventions such as portable devices that can be used in remote and resource-less conditions and have an impact on quantity and quality of care. Additionally, smartphone-based devices have shown their application in the field of tele imaging, food technology, education, etc. Depending on the application and imaging capability required, the optical arrangement of the SID varies which enables them to be used in multiple setups like bright-field, fluorescence, dark-field, and multiple arrays with certain changes in their optics and illumination. Smartphone-based devices are complemented with deep learning methods to further increase the efficiency of the devices.

Routine diagnosis like haematological and histopathological examinations, rapid examination of metabolites in blood and body fluids and also vital health parameters can be done using this method of BLIPS microscopy, where the live images can be seen using an iPad. Detection and identification of bacterial pathogens from biological samples are key to diagnose a myriad of infectious diseases. However, conventional methods including culture-based methods or PCR-related detections are cumbersome, time-consuming, and require adequate resources such as expensive instruments and skilled technicians. Technology known as CellScope can be used to detect the presence of bacteria using the principle of fluorescence. smartphone-based immunoassay



platform for the virus detection integrated with the microfluidic cassette containing the preloaded enzymes and antibodies has been developed. This can be used instead of more expensive methods. The smartphone-based microscopic imaging system complimented with image processing utilizing deep leaning–based CNN. A smartphone-based imaging being a cost-effective, portable, and powerful technique can have many more useful applications in the coming days. It has shown promising results when employed with deep learning image processing techniques for analysis, particularly in remote areas and also during medical emergencies; furthermore, when the complete medical assistance is not easily available, these smartphone-based microscopes can be used to analyze the disease conditions in a short interval of time, hence reducing causality and improving the health care system. SIDs have undergone continuous development with the integration of different types of microscopic and spectroscopic techniques to gain rapid appreciation in the market.

Most of the devices use smartphone camera as the detection system which gives the user ubiquitous ability for colorimetric, fluorescence, absorbance, luminescence, and reflectance measurements. SIDs have enabled research in the fields of material science, cell biology, virology, and other related areas to explore and discover the unknown. From the detection of various disease-causing pathogens to food science and education, these devices have shown numerous possibilities



Embedding new sensor and applications with smartphones have given the ability to measure more physical quantity today than it was 10 years before. Further being connected to several wired and wireless connections also gave SIDs the advantage to record data automatically on cloud servers or share them in secure platforms for expert analysis. The simplicity, low-cost, portability of SIDs and availability of user-friendly application make them an attractive alternative with possible prospects being incredible. The added advantage is that analysis is faster and they can be used even without the presence of a trained personnel.

Reference:

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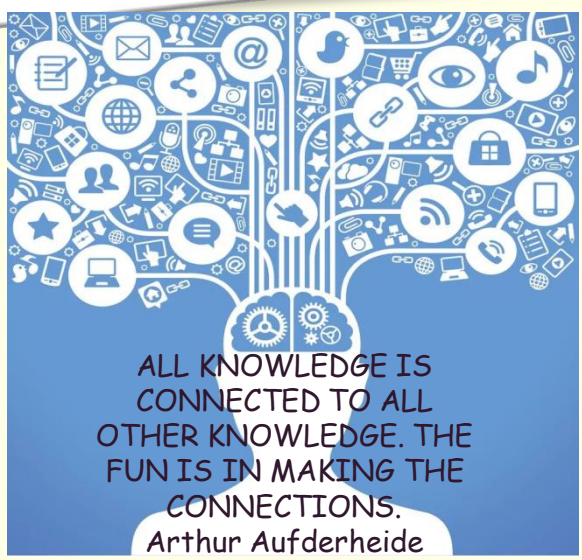
Early career Sci-Talk Series – 1

Department of Pharmaceutics, Faculty of Pharmacy, Ramaiah University of Applied Sciences organized Early career Sci-Talk Series – 1 for students and faculty featuring informative talks by young scientists and researchers from academia as well as industry on various aspects of pharmaceutical drug development, between June 18 and July 23, 2022. The seminar series was open to UG students, PG students, research scholars and faculty members. About 119 participants registered for this event. The weekend-only sessions commenced from June 18, 2022. The thought-provoking sessions were filled with interesting questions from the audience. The month-long webinar series concluded with the valedictory session and feedback from participants.



A Bird's Eye View on Pharmaceutical Profession

Dr. Sunil Chiplunkar, Vice President - Business Development at Group Pharmaceuticals Ltd., an inspirational speaker addressed B pharm and M Pharm students. Various tips on the importance of body language and accent in marketing was emphasized. The session was extremely well received and the speaker enthusiastically shared his vast experience with the students.

Essential Skills to Score a Pharmaceutical Company Employability

Dr. M.G. Jayathirtha currently working as a teamlead (clinical data management) in Tata Consultancy Services, Bengaluru interacted with the young minds of FPH. He gave the students the idea that thinking out of the box would enable students to expand their horizons. Sir also explained how important it was to have a continuous learning mindset to achieve greater career growth. He also gave several examples from his life on how to succeed.

Alumni Buddy Session

A interactive 'Buddy Session' was organised where the outgoing students provided an insight on their experience in the institution. All alumni's expressed their privileged in being a part of this faculty and university and skills they acquired. The importance of being self motivated and significance of professional behaviour was conveyed. They also stressed upon the importance of taking up additional courses to boost their resume and upskill themselves.

Congratulations

The top academic performers in B Pharm for the subjects handled by the Department of Pharmaceutics

I B Pharm
Environmental Sciences
Ms. Anuhya B (96%)

I B Pharm
Environmental Sciences
Ms. Jagruthi Mahesh (96%)

I B Pharm
Computer Applications
Ms. Anuhya B (95%)

II B Pharm
Physical Pharmaceutics
Ms. Kushboo Kumari (96%)

III B Pharm
Biopharmaceutics and Pharmacokinetics
Mr. Tejas Kumar (95%)

IV B Pharm
Pharmaceutical Marketing
Mr. Kumar Gaurav (92%)

Congratulations

The top academic performers in Pharm D for the subjects handled by the Department of Pharmaceutics

I Pharm D
Pharmaceutics
Mr. Sreevathsa (89%)

II Pharm D
Pharmaceutical Microbiology
Ms. Crispin Dona (93.5%)

III Pharm D
Pharmaceutical Formulations
Ms. Aarti Krishnan (93.5%)

III Pharm D
Pharmaceutical Jurisprudence
Chandan (91%)

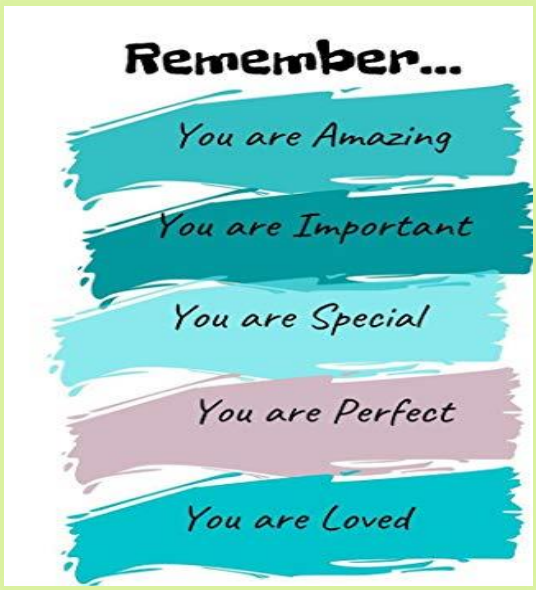
IV Pharm D
Biopharmaceutics and Pharmacokinetics
Ms. Agnisha (94%)

IV Pharm D
Biopharmaceutics and Pharmacokinetics
Ms. Sarika (94%)

The top academic performer in M Pharm - Pharmaceutics (I Semester)

I M Pharm
(Pharmaceutics)
Ms. Sharon Esther Samuel (88.6%)

Words of Wisdom



Top Ten Biggest Biotechnology Companies of 2022

The biotechnology industry is comprised of hundreds of companies that fuse biology and technology to develop drugs and related products for the treatment of diseases and medical conditions. Below are the top ten biotech companies of 2022

Novo Nordisk

Revenue (TTM): $18.3 billion
Net Income (TTM): $5.8 billion
Market Cap: $118.6 billion
Novo Nordisk is a multinational biotech company headquartered in Denmark with production facilities in seven countries and affiliates or offices in 80 countries. The company's primary focus is diabetes care, hemophilia care, and hormone replacement therapy. The company makes several drugs including Novolin R, NovoSeven, and Victoza.

Regeneron Pharmaceuticals Inc.

Revenue (TTM): $7.9 billion
Net Income (TTM): $2.1 billion
Market Cap: $49.5 billion
Biopharmaceutical company Regeneron develops and markets drug treatments for patients with eye disease, cancer, cardiovascular diseases, allergic and inflammatory issues, and infectious diseases. Through its Regeneron Genetics Center, the company aims to conduct one of the largest gene sequencing operations worldwide.

Top Ten Biggest Biotechnology Companies of 2022

Alexion Pharmaceuticals Inc.

Revenue (TTM): $5.0 billion
Net Income (TTM): $2.4 billion
Market Cap: $19.0 billion
Alexion is a biopharmaceutical company that develops and markets immunoregulatory drugs for the treatment of cardiovascular and autoimmune diseases. Through its drug therapies, Alexion aims to provide patients with compounds that selectively target portions of the immune system which may allow diseases to proliferate.

Vertex Pharmaceuticals Inc.

Revenue (TTM): $4.2 billion
Net Income (TTM): $1.2 billion
Market Cap: $57.9 billion
Biopharmaceutical company Vertex focuses on creating and marketing drug treatments for patients suffering from cancer, cystic fibrosis, autoimmune diseases, and neurological disorders, among others.

Incyte Corp.

Revenue (TTM): $2.2 billion
Net Income (TTM): $0.5 billion
Market Cap: $14.6 billion
Focusing on small molecule drugs for use in oncology primarily, Incyte is a biopharmaceutical company responsible for discovering, developing, and marketing drug therapies. The company is best known for its drug Jakafi, a treatment for myelofibrosis.

Top Ten Biggest Biotechnology Companies of 2022

Jazz Pharmaceuticals PLC

Revenue (TTM): $2.2 billion
Net Income (TTM): $0.5 billion
Market Cap: $5.4 billion
Irish biopharmaceutical company Jazz Pharmaceuticals creates and commercializes drug products designed to address issues related to narcolepsy, psychiatry, pain management, and oncology. On March 25, the company announced FDA approval of its drug JZP-258 for the treatment of cataplexy or excessive daytime sleepiness.

Biomarin Pharmaceutical Inc.

Revenue (TTM): $1.7 billion
Net Income (TTM): -$0.02 billion
Market Cap: $14.4 billion
A maker of therapeutic enzyme products, Biomarin Pharmaceutical develops drug treatments for lysosomal storage diseases as well as serious burns. The company also provides diagnostic and analytic services for carbohydrate biology applications.

United Therapeutics Corp.

Revenue (TTM): $1.4 billion
Net Income (TTM): -$0.1 billion
Market Cap: $3.9 billion
United Therapeutics primarily develops drug treatments for pulmonary hypertension, peripheral vascular disease, and other vascular conditions. Among the company's most popular medicines are Remodulin, Orenitram, Unituxin, and Tyvaso.

United Therapeutics
CORPORATION

Top Ten Biggest Biotechnology Companies of 2022

Alkermes PLC

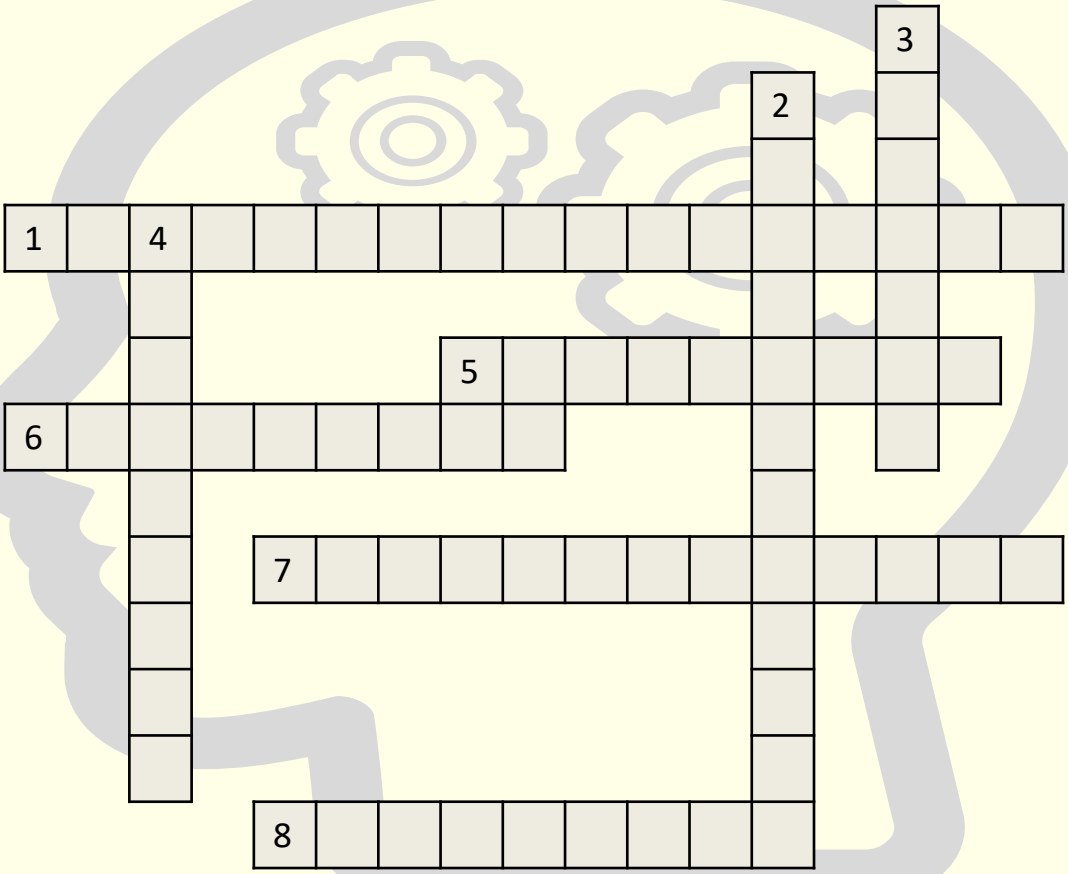
Revenue (TTM): $1.2 billion
Net Income (TTM): $-0.2 billion
Market Cap: $2.2 billion
Alkermes is an Irish biopharmaceutical company. This firm creates treatments for central nervous system disorders including depression, schizophrenia, and addiction. It also focuses on treatments for diabetes.

Ionis Pharmaceuticals Inc.

Revenue (TTM): $1.1 billion
Net Income (TTM): $0.3 billion
Market Cap: $6.2 billion
Biotechnology company Ionis discovers and develops RNA-based therapeutic products. Its three primary, commercially-available medicines include WAYLIVRA, Spinraza, and Tegsedi. It also has drug treatments in various stages of development to treat Huntington's disease, ALS, and cardiovascular disease.

This year's theme, **"Pharmacy united in action for a healthier world,"** aims to promote unity and highlight the sound effects of pharmacy on health. The theme has been chosen to "showcase pharmacy's positive impact on health around the world and to further strengthen solidarity among the profession".

PUZZLE PUNCH



ACROSS

1. This is the most important step in processing of acellular dermal matrices
5. This is one of the physical decellularization techniques
6. Blood drawing apparatus of mosquitoes
7. Drug present in the first 3D printed drug product
8. This is an anticoagulant present in mosquito saliva

DOWN

2. One of the applications of cubosomes
3. This protein from mosquitoes is investigated for many tissue engineering applications
4. Liquid crystalline nano-structures formed from the cubic phase of lipids

Submit your answers to the Editorial team – prizes to be won
(sharoncaroline.ps.ph@msruas.ac.in)

HIDDEN WORD SEARCH

R	C	I	R	A	L	I	M	I	S	O	I	B	E
A	A	A	O	T	B	I	E	M	M	N	C	O	F
T	C	S	Y	C	M	I	I	E	N	T	I	A	I
E	O	Z	S	T	Z	O	L	T	O	A	T	A	L
C	M	O	A	F	A	I	I	A	I	I	U	B	F
O	P	M	R	G	U	R	D	B	T	P	E	S	L
N	A	A	C	C	I	G	E	O	I	A	P	O	A
S	R	X	N	I	C	U	O	L	S	H	A	R	H
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A	M	N	S	E	S	A	R	Z	P	L	E	T	N
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E	T	O	D	G	T	R	O	T	D	E	T	N	C
D	T	T	I	S	E	X	C	R	E	T	I	O	N

CLUE – Find 12 words related to Biopharmaceutics

Submit your answers to the Editorial team – prizes to be won
(sharoncaroline.ps.ph@msruas.ac.in)

FROM HODs DESk



Best article award

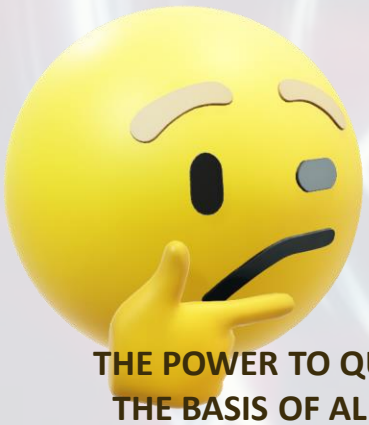
Ms.Bhavana, Ms. Akshitha & Ms.Anuhya for the article titled **'EXTENDED REALITY (XR) : A Revolutionary Cutting-edge technology in Pharma industry'**

Puzzle punch winner
Ms. Simran Sahani

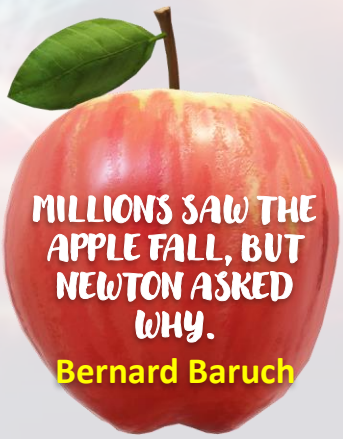
CURIOUS MIND

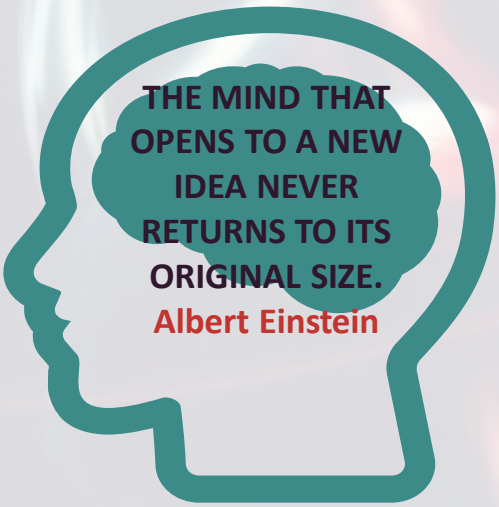
PROGRESS IS BORN OF DOUBT AND INQUIRY.
Robert G. Ingersoll

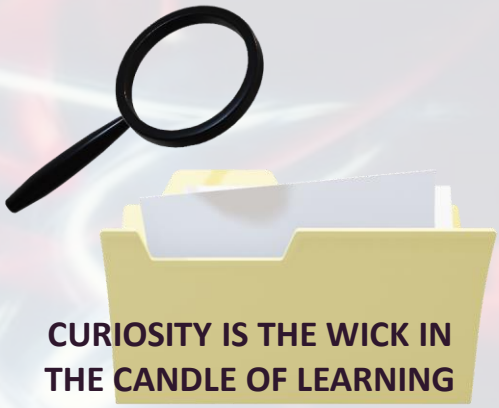
IT IS A NARROW MIND WHICH CANNOT LOOK AT A SUBJECT FROM VARIOUS POINTS OF VIEW.
George Eliot



THE POWER TO QUESTION IS THE BASIS OF ALL HUMAN PROGRESS.
Indira Gandhi







CURIOSITY IS THE WICK IN THE CANDLE OF LEARNING
William Arthur Ward

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(Approved by PCI and AICTE)

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