



Department of
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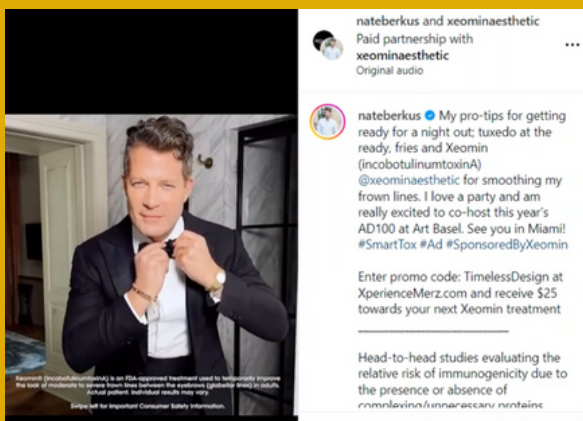


FLEXIBLE MANUFACTURING

- FMS, its Advantages & Disadvantages
- Industrial FMS communication
- The caveats of flexible manufacturing systems
- Benefits of flexible manufacturing systems

SENSOR TECHNOLOGY

- Introduction
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FLEXIBLE MANUFACTURING

A flexible manufacturing system (FMS) is a manufacturing system in which there is some amount of flexibility that allows the system to react in case of changes, whether predicted or unpredicted.

This flexibility is generally considered to fall into two categories, which both contain numerous subcategories.

·The first category is called routing flexibility, which covers the system's ability to be changed to produce new product types, and the ability to change the order of operations executed on a part.

·The second category is called machine flexibility, which consists of the ability to use multiple machines to perform the same operation on a part, as well as the system's ability to absorb large-scale changes, such as in volume, capacity, or capability.



Most flexible manufacturing systems consist of three main systems:

1. **The work machines which are often automated CNC machines are connected by**
2. **By a material handling system to optimize parts flow and**
3. **The central control computer controls material movements and machine flow.**

The main advantage of a flexible manufacturing system is its high flexibility in managing manufacturing resources like time and effort to manufacture a new product.

Advantages

- Reduced manufacturing cost
- Lower cost per unit produced,
- Greater labor productivity,
- Greater machine efficiency,
- Improved quality,
- Increased system reliability,
- Reduced parts inventories,
- Adaptability to CAD/CAM operations.
- Shorter lead times
- Improved efficiency
- Increase production rate

Disadvantages

- **Initial set-up cost is high,**
- **Substantial pre-planning**
- **Requirement of skilled labor**
- **Complicated system**
- **Maintenance is complicated**



The “flexible” aspect of flexible manufacturing boils down to either routing flexibility or machine flexibility. Routing flexibility means that a business can rearrange the sequence of a product’s manufacture and assembly to adapt to changing circumstances. So, if a product takes several stages and workstations to completely produce and assemble, the company can re-order the sequence of work to keep production going if a supply disruption or machine maintenance affects one of the stages. With machine flexibility, a manufacturer can produce the same product using different machines, with minimal differences in the quality and details of the product. For example, if one machine needs maintenance or there is a sudden surge in demand, the company can shift production over to another machine or set of machines.

BENEFITS OF FLEXIBLE MANUFACTURING SYSTEMS

MANY INDUSTRIES LIKE AUTOMOTIVE, AEROSPACE, ELECTRONICS, MEDICAL DEVICES, FOOD PROCESSING, AND OTHERS GREATLY BENEFIT FROM INVESTING IN FLEXIBLE MANUFACTURING SYSTEMS.

- **IMPROVE QUALITY AND PRODUCTIVITY**

REMARKABLE ACCURACY AND RELIABILITY FROM FMS IMPROVE QUALITY CONTROL AND DATA MONITORING CAN IDENTIFY AND ADDRESS QUALITY PROBLEMS QUICKLY. PRODUCTION IS MORE EFFICIENT BECAUSE VERY LITTLE DOWNTIME IS NEEDED TO SET UP FOR DIFFERENT PRODUCTS OR PRODUCT VARIATIONS.

- **SAVE COSTS**

WITH THE EFFICIENCY OF FMS, MANUFACTURERS CAN INCREASE MARGINS BECAUSE THEY MAINTAIN PRODUCTION USING FEWER RESOURCES. FLEXIBLE MANUFACTURING SYSTEMS NEED SKILLED, WELL-COMPENSATED WORKERS TO MAINTAIN, BUT IMPLEMENTING THEM CAN REDUCE OVERALL LABOR COSTS IN THE LONG RUN.

- **REDUCE ERRORS AND WASTE**

FLEXIBLE MANUFACTURING SYSTEM IS LESS PRONE TO ERROR WHEN IT’S PART OF A CONNECTED FACTORY THAT USES CONSTANT DATA STREAMS FROM THE INDUSTRIAL INTERNET OF THINGS (IIOT) TO MONITOR SYSTEMS AND EXERCISE PREDICTIVE MAINTENANCE. ERRORS THAT DO OCCUR ARE EASIER TO FIX AND CAN BE ISOLATED IN THE FMS SO THAT OTHER PARTS OF THE SYSTEM CAN CONTINUE TO RUN—ALL LEADING TO LESS MATERIAL WASTE FROM MISTAKES AND REWORK.

THE CAVEATS OF FLEXIBLE MANUFACTURING SYSTEMS

Before moving forward with flexible manufacturing systems, businesses should understand the significant upfront investment needed to purchase, install, and set up equipment. There may also be a skills gap in the existing workforce, which may require training to get up to speed on the new systems or hiring new engineers and technicians to supplement the workforce. Once running, FMS can also be expensive to maintain and support.

Given those caveats, once manufacturers have bought into flexible manufacturing, they can be more efficient, agile, and less at the mercy of volatile supply chains and demand fluctuations. With FMS in place, changes to product demand and supply chains are more easily handled by adapting production setups to work with different products or assemblies, or to self-produce needed parts.

SENSOR TECHNOLOGY

A sensor is a device that senses physical, chemical, and biological signals and allows them to be analyzed and reported. Heat, weight or gravity, noise intensity, pressure, illuminance, vibration, rate of flow of liquids and gases, magnitude of electronic and magnetic fields, and amounts of different compounds in different forms (solid, liquid or gaseous) are all physical characteristics that may be detected. Even though sensors currently are where computers were in 1970, therapeutic uses of sensors are growing of because of improvements in microprocessor technology and chemical science.

The development of micro sensor systems for biological applications is gaining popularity. The medical uses of this kind of sensors are immense, notably in point-of-care and intensive care diagnostics. Significant developments are anticipated to deliver the desired enhancements inconvenience, patient safety, affordability, and response time, or even have a significant influence on healthcare in the early twenty-first century.

New domains, coupled with ongoing research into innovative biocatalysts and selective biosensors based on acoustic, electrochemical, optical, or piezoelectric transducers, will undoubtedly increase the therapeutic use of biosensors and electroanalysis

The latest advancements of sensors and biosensors is mostly owing to two factors, one of technological nature and another of sociological nature. For several years, the necessary monitoring to assure people's safety and protection was dependent on separation methods, primarily chromatographic strategies paired with high-sensitivity detection techniques, beginning with mass spectroscopy.

BIOSENSORS

A biosensor is a device that detects biological and chemical responses by producing signals corresponding to the concentration of the analyte in the reaction. Biosensors should be incredibly precise and consistent, irrespective of external factors such as pH and temperature. Biosensors are used in the medicinal field for disease management, drug development, as well as for detecting contaminants, infective microorganisms, and disease markers in biological fluids (blood, urine, saliva, sweat). The components of a typical biosensor include a bioreceptor, a transducer and a signal amplifier. DNA probes, antibodies, enzymes, and cell receptors that bind with the analyte can all be used as biosensing substances. The transducers, which can be made of acoustic, optical, physicochemical, or piezoelectric material, convert biological input to optical and electrical output.

Types of Biosensors

Biosensors can be classified into several types based on how they transmit signals. Leland C. Clark first demonstrated electrochemical sensors in 1962. In this biosensor, interactions can occur between molecules and reactants to produce an electrical signal corresponding to the analyte concentration. It utilizes amperometric, conductometric, and potentiometric devices to transform sensory input into a quantifiable output, based on this concept

- **Electrochemical :** Electrochemical sensors have been extensively used in forensic science fields, notably in the detection and analysis of drugs, employing a wide range of devices to attain the necessary specificity and sensitivity. Despite their apparent benefits, electrochemical sensors must be expanded to analyze numerous drugs or illegal narcotics, and common additives and chemicals, in terms of providing the forensic community with a comprehensive and efficient analyzing tool
- **Optical :** One of the most widely used types of biosensors is an optical biosensor. Optical biosensors are anticipated to acquire the most popularity in the pharmaceutical, bio-medical, and biopharmaceutical industries. These sensors can give novel analytical techniques that are smaller in size, along with allowing large-scale high-throughput sensitivity analysis of a large number of analytes for a variety of parameters. Numerous techniques for improving the sensitivity of optical biosensors were designed to enhance the signal-to-noise ratio and lower the detection limit.
- **Thermometric :** Thermometric biosensors make use of a significant component of biological processes, namely heat absorption or release. The temperature of the reaction system alters as a result of this. Thermometric measurement is essential to determine the amount of energy produced or absorbed during a biological reaction. Several compounds, including ethanol, glucose, lactate, triglycerides/peroxides, oxalate, urea, ascorbate, cellobiose, and sucrose, as well as penicillin, were analyzed employing different versions of the thermometric devices.



Immunosensors :

- Immunosensors are a type of specificity biosensors that are based on associations between an antigen and a specified antigen immobilized on the surface of a transducer.

Magnetic Biosensors : By enabling analyte identification, modification, and sorting, magnetic biosensors can replace or enhance current fluorescence-based in vitro biosensor methods. Nevertheless, despite the presence of early initiatives including magnetic actuation for cellular functioning control as well as detecting endogenously generated magnetic nanoparticles by a tunnel magneto-resistance (TMR) sensor, applications of in vivo magnetic biosensor remain a challenge for the future.

Acoustic Biosensors : Acoustic biosensors are built on specialized surface acoustic wave (SAW) technology that would allow for the very sensitive identification of biorelevant chemicals in liquid media. The majority of the current investigation focuses on the following acoustic systems for their applications: Bulk acoustic wave (BAW)-based biosensors employing quartz crystal microbalance (QCMs) and surface acoustic wave (SAW)-based biosensors.

Enzyme Biosensor : Enzyme biosensors are chemical biosensors based on biological detection. To function, the enzymes should be accessible to catalyze a particular biochemical process and be persistent under the biosensor's typical working circumstances. Biosensor design is influenced by an understanding of the analyte of interest along with the intricacy of the matrices in which the sample must be measured.

DNA Biosensor : DNA biosensors (geno sensors) are made up of an immobilized strand of DNA that detects complementary sequences by DNA-DNA pairing, which occurs directly on the surface of a physical transducer. In a broader sense, these biosensors can still be used to accurately detect analytes, with the probing molecule often taking the form of an aptamer. Geno sensor has been used because of their intrinsic physicochemical resilience and ability to distinguish between various strains of organisms.

Nano biosensors : Nano biosensors use the distinct biological and physical characteristics of nanomaterials to detect a target molecule and perform electrical signal transduction. When compared to current large electrodes used in biosensors, the benefits of nano biosensors include quick response, small size, sensitivity and selectivity, and mobility. The main technology that permits small medication is systems integration. The convergence of nanoparticles, microfluidic devices, automated samplers, and transduction devices on a microchip offers several benefits for point-of-care technologies like biosensors.

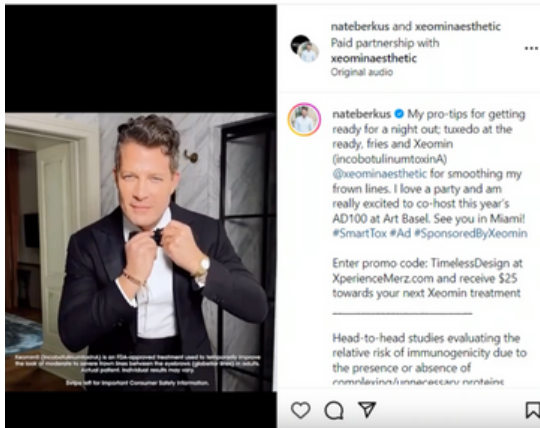
APPLICATIONS OF BIOSENSORS

Biosensors have been used in a variety of areas, including the food industry, pharmaceuticals, and the marine sector. They give more stability and sensitivity than traditional techniques.

- In the case of a biological attack, biosensors have been utilized for strategic operations. The primary goal of these biosensors is to detect and identify organisms that pose a danger on time, known as biowarfare agents (BWAs), like bacteria, toxic chemicals, and viruses. Numerous efforts have been made to design such biosensors utilizing molecular methods capable of recognizing the biomarkers of BWAs.
- Biosensors can be used to evaluate processing conditions passively by analyzing the presence of products, biomass, enzymes, antibodies, or by-products of the process. Because of their simple apparatus, impressive selectivity, low costs, and ease of automated processes, biosensors accurately manage the fermentation process and give consistent results.
- Biosensors are widely utilized in the medical community to detect infectious conditions. A potential biosensor technique for diagnosing urinary tract infections (UTIs), detection of pathogens, and anti- microbial vulnerability is being researched.
- The advent of biosensors as a result of the requirement for simplified, authentic, precise, and low-cost approaches, appears to be advantageous in food processing, control, food validity, safety, and quality. Biosensors have been employed to detect pathogens in food.
- Biosensors have also been used to discover lacking components related to analyte metabolism, modulation, or transportation. A transportation process in phloem loading-sucrose outflow is performed by fluorescence resonance energy transfer (FRET) sensor for sucrose, which is important for protein detection.
- Fluorescent biosensors have been employed in drug discovery and development to identify drugs using high throughput, high content testing techniques, as well as for the post screening interpretation of the findings and lead optimization. These are thought to be effective methods for the clinical and preclinical analysis of prospective drugs' therapeutic properties, bioavailability, and pharmacokinetics.

REGULATORY UPDATES FORUM

OPDP reprimands Merz over Instagram ad for Botox competitor Xeomin



- The US Food and Drug Administration's Office of Prescription Drug Promotion (OPDP) sent an untitled letter to Merz Pharmaceuticals concerning a recent paid Instagram post promoting its Botox competitor Xeomin (incobotulinumtoxinA).
- The post in question was made by both Merz on its Xeomin Aesthetics Instagram account and interior designer Nate Berkus on his personal account and depicts Berkus getting ready to co-host AD100 at Art Basel in Miami last December, who frets that "you never know when those lines might decide to make a surprise appearance."
- Berkus continues saying that his dermatologist recommended Xeomin, "a double-filtered smart tox that smooths the look of frown lines with only the ingredients that you need for treatment."
- FDA also took issue with the claims made in the video, including the suggestion that "Xeomin provides faster or more rapid results than have been demonstrated." FDA notes that the video implies that the "surprise appearance" of frown lines can be addressed in time for a same-day event.
- FDA continues by stating the "post is misleading because it fails to present information relating to side effects and contraindications associated with the drug with a prominence and readability reasonably comparable with the presentation of information relating to the benefits of the drug,"

ASIA-PACIFIC ROUNDUP: MEDSAFE CUTS TIME TO COMPLETE INITIAL APPLICATION EVALUATIONS

The New Zealand Medicines and Medical Devices Safety Authority (Medsafe) reduced the time taken to complete the initial evaluation of applications in its most recent financial year, achieving its goal more consistently than in the previous year.

Medsafe seeks to complete the initial evaluation of higher-risk applications within 150 working days, but only did so 58% of the time during its last financial year, which ended in June 2023. The mean time to finish the initial review was 153 days.

The agency improved both figures in the financial year ended June 2024, achieving its goal 82% of the time in a mean processing time of 112 days. The data cover applications that were completed, but not necessarily received, in the 12-month reporting period.

The regulatory landscape of ingestible medical devices in the United States

Ingestible medical devices offer novel diagnostic, monitoring, and treatment capabilities. This article explores the regulatory landscape of ingestible devices in the US, highlighting the US Food and Drug Administration (FDA) classifications, clearance, and approval processes. It discusses preclinical and clinical data considerations, post market requirements, and challenges in bringing these devices to the market. The article includes examples of ingestible devices cleared and approved in the last decade, their timelines, and the potential of these emerging technologies to revolutionize patient care.

FDA proposes removing oral phenylephrine from use in nasal decongestants

The US Food and Drug Administration (FDA) announced on Thursday plans to remove oral phenylephrine from the over-the-counter (OTC) monograph for nasal decongestants following an “extensive review” which found that the ingredient is ineffective.

This action follows the recommendation of FDA’s Nonprescription Drug Advisory Committee, which voted unanimously against the drug’s effectiveness as an orally administered nasal decongestant during a meeting in September 2023. Phenylephrine is a common ingredient in combination OTC cold and sinus relief medicines and can be found in branded cold products including NyQuil, Advil, Tylenol, and Mucinex.

FDA said that since it determined 30 years ago that oral phenylephrine was effective as a nasal decongestant, newer clinical data has emerged that raised questions about the effectiveness of the ingredient.

FDA revises more than 800 PSGs in line with ICH M13A

The US Food and Drug Administration (FDA) on Thursday published revised draft product-specific guidances (PSGs) for immediate-release solid oral generic drugs deemed to be low risk that will no longer require two bioequivalence (BE) studies – one fed and one fasting – to demonstrate BE to a reference-listed drug. Instead, sponsors can choose to conduct either a fed or fasting bioequivalence study for the affected drugs.

The action aligns with the International Council for Harmonisation’s (ICH) M13A guideline, which was adopted in August 2024 and issued as [final guidance](#) by FDA this week. (RELATED: [ICH adopts M13A guideline on bioequivalence testing](#), Regulatory Focus 6 August 2024)

FDA said in a notice accompanying the guidance that the document “aims to increase the efficiency of drug development and accelerate the availability of safe and effective orally administered immediate-release solid oral dosage forms.” FDA is issuing the PSGs that have been affected by ICH M14 in batches.

New Drug Approvals



- Orlynvah

Date of Approval: 10/25/2024

Active ingredient: sulopenem etzadroxil, probenecid

Treatment for: To treat uncomplicated urinary tract infections (uUTI)

- Vyloy

Date of Approval: 10/18/2024

Active ingredient: zolbetuximab-clzb

Treatment for: To treat gastric or gastroesophageal junction adenocarcinoma

- Itovebi

Date of Approval: 10/10/2024

Active ingredient: inavolisib

Treatment for: To treat locally advanced or metastatic breast cancer

- Flyrcado

Date of Approval: 9/27/2024

Active ingredient: flurpiridaz F 18

Treatment for: A radioactive diagnostic drug to evaluate for myocardial ischemia and infarction

- Cobenfy

Date of Approval: 9/26/2024

Active ingredient: Xanomeline and trospium chloride

Treatment for: To treat schizophrenia
Press Release

- Aqneursa

Date of Approval: 9/24/2024

Active ingredient: levacetylleucine

Treatment for: To treat Niemann-Pick disease type C
Press Release

- Ebglyss

Date of Approval: 9/13/2024

Active ingredient: lebrikizumab-lbkz

Treatment for: To treat moderate-to-severe atopic dermatitis

- Livdelzi

Date of Approval: 8/14/2024

Active ingredient: seladelpar

Treatment for: To treat primary biliary cholangitis (PBC)

DEPARTMENT ACTIVITIES

Publications in Scopus Indexed/Web of Science Journals



doi: 10.3389/fphar.2024.1433734

Check for updates

Design and evaluation of magnetic-targeted bilosomal gel for rheumatoid arthritis: flurbiprofen delivery using superparamagnetic iron oxide nanoparticles

EDITED BY
Aleksander Czogalla,
University of Wrocław, Poland

REVIEWED BY
Kamila Środa-Pomianek,
Wrocław Medical University, Poland
Ashish Tiwari,
University of Delaware, United States

*CORRESPONDENCE
Khaleel M. Hosny,
✉ etsewafy2000@yahoo.com

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Introduction: The study aimed to systematically enhance the fabrication process of flurbiprofen-loaded bilosomes (FSB) using Quality by Design (QbD) principles and Design of Experiments (DOE). The objective was to develop an optimized formulation with improved entrapment efficiency and targeted drug delivery capabilities.

Methods: The optimization process involved applying QbD principles and DOE to achieve the desired formulation characteristics. Superparamagnetic iron oxide nanoparticles (SPIONs) were incorporated to impart magnetic responsiveness. The size, entrapment efficiency, morphology, and *in vitro* release patterns of the FSB formulation were evaluated. Additionally, an *in situ* forming hydrogel incorporating FSB was developed, with its gelation time and drug release kinetics assessed. *In vivo* studies were conducted on osteoarthritic rats to evaluate the efficacy of the FSB-loaded hydrogel.

BENTHAM SCIENCE

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Abstract

The implementation of several innovative drug delivery technologies has made medication distribution more focused and managed in recent years. These days, a vesicular drug delivery system defines the rate of distribution and the site of action in order to improve the action and increase patient compliance; there are various kinds of newly developed vesicular drug delivery systems, including transferrosomes, niosomes, aquasomes, ulasomes, pharmacosomes, and phytosomes. Ufasomes are unsaturated fatty acid vesicles with a limited pH range of 7 to 9. They are a suspension of closed lipid bilayers made of fatty acids and their ionized species. The hydrocarbon tails of fatty acid molecules are oriented toward the membrane's inner core, and their carboxyl groups are in contact with water. The two fatty acids that are most frequently employed in the ulasomes' manufacturing process are oleic and linoleic acids. It is a common practice to produce fatty acid vesicles via the thin film hydration process. The manufacture of stable ulasomes is mostly dependent on the choice of fatty acids, amount of cholesterol, pH range, buffer, etc. This article goes into additional detail regarding unsaturated fatty acids' characteristics, benefits, and drawbacks.

Keywords: ulasomes, thin film hydration, solvay, exosomes, oleic acid, fatty acid vesicle, linoleic acid.

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A Comprehensive Review on Oleic Acid Vesicles: A Novel Approach to Drug Delivery

In Press, (This is not the final "Version of Record"). Available online 24 October 2024

Author(s): Sandhya S¹, Jayatheertha S² Lokapur and Prakash S³ Goudanavar

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B.G. Nagara - 571 448, Karnataka

CONGRATULATIONS
on the acceptance of manuscript titled
Exploring Carbon Nanotube Innovations: Patents and Clinical Trials for Diverse Medical Applications

materialstoday COMMUNICATIONS
Cite Score: 5.2
Impact Factor: 3.7

ELSEVIER

SRIKRUTHI K S

Guided by: Dr N Raghavendra Naveen
Supported by: Dr Prakash Goudanavar

Dept. of Pharmaceuticals and Regulatory Affairs

Publications & Other Activities

Nanostructured lipid carrier: A versatile platform for enhanced drug delivery and therapeutic efficacy

Madhu B K¹, Ananya M C², Sachinkumar M R¹, Sinchana P⁴^{1,2,3,4} Sri Adichunchanagiri college of pharmacy, Adichunchanagiri University

Abstract— Topical drug delivery usually offers greater benefits over oral drug delivery system which include patient compliance, avoidance of first-pass metabolism. However, the topical delivery is hindered by its poor permeability across the stratum corneum, the primary skin barrier. Nanostructured lipid carriers represent cutting-edge, second-generation lipid-based delivery system, developed to overcome limitations of traditional formulations. It offers greater therapeutic efficacy, targeted release and improved bioavailability. This comprehensive review offers an overview of NLC's types, development, characterization and application in biomedical and pharmaceutical fields. Here we discuss the key design parameters, techniques of NLC's formulation and functionalization strategies which optimize the NLC performance. The review explores the NLC's potential in delivery of different therapeutic agents including antifungal, anti-inflammatory and anticancer drugs. This review aims to provide an authoritative and concise summary of NLC's advancement, highlighting their potential to revolutionize drug delivery and treatment outcomes.

Index Terms- Nanostructured lipid carriers, targeted release, therapeutic efficacy, drug delivery.

INTRODUCTION

The skin is the super important thing for a human body. It is actually the biggest organ we have, covering our outside. It comprises a tri-layered structure, consisting of the outermost epidermis, followed by the dermis, and culminating in the innermost hypodermis. Skin helps us against germs, UV rays from the sun, chemicals, even physical damages and also it keeps our body just at the right temperature.(1) The epidermis is a special type of skin layer called stratified squamous epithelium. Its biggest cell type is called keratinocyte. Now, the dermis sits below the epidermis and is surrounded by fat under the skin.(2) Skin conditions are now the fourth biggest reason for non-fatal health issues. Various skin conditions affect

Topical drug delivery systems are ways to put medicine on the body's surface. This medicine can get absorbed through the skin.(4)

The stratum corneum is the outer covering of our skin, it is the toughest part. This can make it hard for medicines to get through when applied on top.(5) Skin-targeted topical delivery using nanosystem is a smart way to help medicine to slowly release. This helps keep treatments focused on the skin. It means better results for tough skin problems.(6) Today, the scientific world has come up with several ways to deliver active pharmaceutical ingredients through our skin. There are different like reservoir matrices, controlled diffusion devices and even fancy system such as multilayer matrix assemblies and solid lipid nanoparticles. Among all these Nanostructured lipid carriers (NLC) have become quite popular. These carriers are made of natural lipid materials that work great for applying medicine on the skin or even deeper.(7) Nanotechnology is all about working with tiny structure of matter, their size usually ranges from 1 to 100 nanometres which is very small. These tiny particles are known as nanoparticles. They usually have shapes and structures at the nanoscale.(8) This review gives talks about how nanostructured lipid carriers could help to treat different skin problems. They might also fix some issues with regular topical treatments.

NANOSTRUCTURED LIPID CARRIERS

The NLC system utilizes natural lipid components to create a nanoscale delivery framework that are great for spreading medicine on the skin. They work for topical, dermal and even transdermal delivery. NLC are made from safe, biodegradable lipids, which means they usually are not harmful to our bodies.(9) It stays solid at room temperature. The advantages of



The Indian Pharmaceutical Association(IPA) , Karnataka State branch, B.G Nagara branch and Adichunchanagiri University(ACU) organized "**One day focused workshop on key topics of Quality Management Systems (QSM)**" in association with Karnataka Drugs and pharmaceuticals Manufacturers' Association.

- **21/09/2024, Saturday**

- **9:30 Am to 5:00 Pm**

- BGS College of Engineering and Technology
#3rd Main, Pipeline Road, Mahalakshimpuram, Bangalore.

We are delighted to announce the establishment of a **new tradition** within the Department of **Pharmaceutics and Regulatory Affairs** — the '**Best Outgoing Researcher**' award, specifically dedicated to recognizing the outstanding contributions of our Postgraduate students. We are proud to present the inaugural '**Best Researcher**' award to **Srikruthi KS**, whose exceptional dedication and research acumen have truly set her apart.



Our Team

- | | | |
|---|--|--|
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| 2. Dr Kiran Kumar G B , Professor | 6. Dr. Madhu B K , Assistant Professor | 10. Mr. Amar S , Assistant Professor |
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