IJMPR 2023, 7(10), 32-40

International Journal of Modern Pharmaceutical Research

www.ijmpronline.com

ISSN: 2319-5878
IJMPR
Review Article

SJIF Impact Factor: 5.273

A REVIEW ON PHARMACOSOMES

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Received on: 09/08/2023

Revised on: 29/08/2023

Accepted on: 19/09/2023

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ABSTRACT

Novel drug delivery system mainly used to achieving the particular concentration of the drug release at targeted site by using carrier system, it is used to altering the structure and microenvironment around the drug. Especially drugs which are having narrow therapeutic window are difficult to formulate, with the advantage of novel drug delivery systems like particulate, polymeric carrier, macromolecular and cellular carriers. They are used to reduce complications as well as release the drug in a determined fusion at targeted site. Pharmacosomes offer a promising method of delivering medications that are not readily soluble in the body. They can also enhance the biopharmaceutical qualities of phytochemicals that are biologically active, such as flavones, glycosides, xanthones, and other compounds. As a result, pharmacosomes can serve as straightforward, secure, efficient, and stable drug delivery systems that can be created using uncomplicated, repeatable processes for enhanced therapeutic performance.

KEYWORDS: Pharmacosomes, Novel Drug Delivery System, Miscelle, Controlled Release.

INTRODUCTION

A great deal of emphasis has been placed in recent decades on the development of novel drug delivery systems. The most appropriate system is a novel drug delivery system that is approachable in developing drug delivery systems that improve the therapeutic efficacy of new as well as existing drugs, thereby providing controlled and sustained drug delivery to specific sites and meeting the body's real and appropriate drug demand. This is capable of distributing to a specific spot of action. It is increasingly crucial to minimize adverse effects and maintain a relatively constant and potent level of the medicine in the body by using novel drug delivery methods. The novel drug delivery system should ideally meet two criteria.

1. Firstly, during the course of treatment, it should supply the drug at an appropriate rate determined by the demands of the body. Secondly, it must transport the active component to an area of action.
2. The following objectives are achieved by this novel drug delivery reduction of harmful or hazardous consequence.

- Keeping drug concentrations within a range that will give it a long-lasting effect.
- Reduction maximum effective dose of the medication.
- Maximum effective dose of the medication.

A medication gets dissolved into the gastric fluid (hydrophilic environment) upon oral consumption. At first, the substance permeates the biological membranes (lipophilic environment), then eventually reaches the blood. Many synthetic and natural medicines have issues with either inadequate uptake or inadequate penetration across the biological membrane, which reduces their ability to be absorbed and generally made available to the body system. Poor penetration may be caused by the drug's structure, whereas inadequate intake may be caused by their low water solubility.

Several strategies have been researched to enhance the biologically active ingredients' absorption and penetration, both of synthetic and natural origin. Consequently, creating the medications as lipid complexes (also known as pharmacosomes) may show to be a viable strategy for increasing solubility and penetration and reducing the gastrointestinal toxicity. Any medication with an active hydrogen atom (-COOH,-OH,-NH2). The zwitterionic, amphiphilic, stoichiometric complexes of polyphenolic chemicals with phospholipids are specifically referred to as pharmacosomes. Due to their amphiphilic properties, pharmacosomes can incorporate both hydrophilic and lipophilic medications, improving their solubility and bioavailability while reducing the gastrointestinal toxicity of many pharmaceuticals. Lipids can be broadly categorized as hydrophobic or amphiphilic tiny molecules; some of these properties allow them to form structures like vesicles. These structures are known as pharmacosomes

because they are created by binding a drug (pharmakon) to a carrier (Soma). After absorption, the process of breakdown into active drug molecules can be broadly classified as hydrophobic and amphiphilic small molecules. Some of these lipids' amphiphilic properties allow them to form structures like vesicles.

After absorption, the frequency of degradation into small molecules thatare active drug molecules can be broadly classified as hydrophobic and amphiphilic. The amphiphilic nature of some lipids allows them to form structures like vesicles to a large extent depending on the sizeand functional group of the drug molecule, the length of the lipid chain, and the spacer. Depending on the chemical nature of the drug lipid complexes, pharmacosomes are colloidal dispersions of drugs thatare covalently bonded to lipids and may take the form of an ultrafine, vesicular miscellar or aggregates. Drug and lipid interactions affect the pharmacochemical characteristics of pharmacosomes. Ultrafinevesicular and miscellar forms of pharmacosomes include hexagonal aggregates. Pharmacosomes for several NSAIDS, proteins, cardiovascular, and anti-cancer drugs have been developed. The development of pharmacosome-based medications has been demonstrated to increase absorption and reduce GI toxicity. Examples of compounds that contain hydrogen: chloroform (CHCl3), ammonia (NH3). Consequently, these pharmacosomes are a useful tool for achieving desired therapeutic objectives, such as numerous medication targeting and controlled release.

Advantage

- The drug delivery is done directly.
- Compound is dependent on the point of phase transition but does not affect the rate ofrelease.
- Covalent connection enhances reliability as well as effectiveness.
- Shortage of toxicity.
- The size, functional components, chain length and spacer determine how quickly a drug molecule degrades into an active form.
- The drug is covalently linked to the carrier so it does not take place leakage of drug.
- The inclusion of drugs poses no issues.
- The physicochemical characteristics of the drug lipid complex determine the physicochemical rigidity of the pharmacosome.
- Directly delivery of drugs to the site of action is possible.
- In case of insoluble drugs the pharmacosome increase the accessibility.
- There is no requirement to remove the free, unentrapped medicine from the formulation as there would be with liposomes.
- Ability to guide a medicine to an illness spot.
- Ability to extend the time that a drug remains in the bloodstream.
- Increase the weakly soluble water's solubility.
- Ability to improve bioavailability and decrease the medication toxicity.
- It may be administered directly to the skin, through the blood stream, or orally.
- The active ingredient is covalently bonded, therefore membrane fluidity has no influence onhow quickly it is released.
- The zwitter ionic, amorphous, and balanced components of polyphenolic chemicals with fatty acids are known as pharmacosome.
- Pharmacosome have improved results in several ways compared to conventional lipid-based delivery systems.
- Because it has a covalent link to the fatty acids, the drug-lipid.
- In the case of a pharmacosome, trapped volume and drug-bilayer contacts do not affect effectiveness of entrap. On the way, in case of liposome, these factors have significant control over the effectiveness entrap.
- The enzymatic degradation is one type of hydrolysis used to remove drugs from pharmacosomes. Their rate of oxidation depends on several factors after digestion, including size, types of functional units, length of fatty acids link and existence or lack of spacer chain. The degree of crystallinity of the medication within the complex affects how quickly it isreleased.
- These amphiphilic substances aggregate depending on concentration in the anhydroussolution.
- Pharmacosomes can be intact with bio membranes, allowing for greater active ingredientdelivery.
- Ability of packaging drugs those are both hydrophobic and lipophilic.
- The degree of entrapment is high, so it is unaffected by drug bilayer interactions orenraptured volume.
- It is appropriate for both hydrophilic and lipophilic drugs.

Disadvantages

- It takes a covalent sort of binding to prevent drug leaking.
- Pharmacosomes are vulnerable to enzymatic hydrolysis, aggregate formation, and fusion during storage.
- The amphiphilic character of a molecule affects how it is synthesized.
- Lipids and medication must interact on the top layer and volume.
- The drug leaching can be prevented by co a talent link.
- Pharmacosomes can only incorporate the drugs that are not dissolving in water in relatively small hydrophobic areas within the lipid bilayer as opposed to on a sizable surface.
- Water insoluble medications are enclosed in a membrane bilayers less hydroponic portion are oppressed to their comparatively high surface area.

Principle of Pharmacosome

It is based on the idea that the medication binds covalently to a lipid, forming a molecule that serves as both the carrier and the active ingredient at the same time. The physicochemical attributes depend on the lipid and the medication. When storing hydrophilic medications, this device exhibits low trapping efficiency and drug leakage. Pharmacosomes play a role in avoiding the time-consuming procedures involved in releasing the drug from its entrapment. Pharmacosomes, like other members of the vesicular system, offer a reliable method for delivering medication directly to the site of infection. This reduces drug toxicity without causing any negative side effects and lowers the cost of therapy by increasing medication bioavailability, particularly in the case of poorly soluble drugs. Hydrophilic and lipophilic drugs can both be included within the pharmacosomes. The prodrug combines hydrophilic and lipophilic qualities, acquiring amphiphilic characteristics as a result. It was also found to diminish interfacial tension and to demonstrate mesomorphic behavior at greater doses, comparable to other vesicle-forming components. The pharmacosome technique can get around many of the limitations of several classical vesicular drug delivery systems, such as issues with drug integration, leaking from the carrier, or insufficient shelf life. Lipid surface and bulk interactions with drugs were the inspiration for the development of the vesicular pharmacosome. Any medication that contains an active hydrogen atom (-COOH, -OH, NH2, etc.) may be esterified to the lipid, with or without the addition of a spacer chain. An amphiphilic compound that will allow membrane, tissue, or cell wall transfer in the organism may be strongly produced during the synthesis of such a molecule. The amphiphiles exist in the monomers state at low concentrations. More monomers can result in a variety of structures, such as micelles with spherical, rod-like, disc-shaped, cubic, or hexagonal shapes. Mantelli et al. found a comparable effect on lowering surface tension when they compared the effect of a diglyceride prodrug on interfacial tension with the effect induced by a common detergent, dodecylamine hydrochloride. In excess of the critical micelle concentration (CMC), the prodrug displays mesomorphic lyotropic activity and forms supramolecular structures. The manufactured prodrugs are often evaluated for their structural conformation (by IR, NMR spectrophotometry, thin layer chromatography (TLC), and melting point estimation), partition coefficient, surface tension, and prodrug hydrolysis.

Method of Preparation

Pharmacosomes can be prepared by various methods;
Hand shaking method
Ether injection method
Supercritical fluid process
Anhydrous co-solvent lyophilization Method
Solvent evaporation method
Micro fluidization
Reverse section separation
Sonication technique
Alternative method.

Hand shaking method

Solvent is removed using either the hand shaking technique or a rotatory evaporator in the solvent evaporation process. An Initial step involves dissolving a drug and lipid mixture in a volatile organic solvent, such as dichloromethane. A thin layer of the solid mixture is then placed on the flask walls after the solvent is evaporated using a rotatory evaporator in the round bottom flask. The dried film is then moistened with water and quickly produces a vesicular suspension.

Ether injection technique

This technique requires thoroughly mixing of drug-lipid complex solution previous to slowly injecting it through a gauze needle into a heated aqueous media. Vesicles readily create as a result. Pharmacosomes are examined for characteristics including size and size distribution, nuclear magnetic resonance (NMR) spectroscopy, entrapment performance, in vitro release rate and stability tests, just like in other vesicular systems. Amphiphiles' condition relies on concentration. Amphiphiles introduce a monomer state while the concentration is lower, but as the concentration raises, a range of structures, including those of the round, cylindrical, disc, cubic, and hexagonal types, may emerge.

Super critical fluid process

Solution enhanced dispersion by complex supercritical fluid is the name of this technique. Two distinct methods of the supercritical fluid process are used. Increased by gas antisolvent (GAS) and Supercritical fluid dispersion (SEDS). A supercritical fluid of CO2 is used to dissolve the drug and lipid complex, which is subsequently mixed in the nozzle mixing chamber. The rapid mixing of the dispersion caused by the turbulent flow of the solvent and carbon dioxide leads to the creation of pharmacosomes.

Anhydrous co-solvent lyophilization

Anhydrous co-solvent lyophilization process to create a novel insulin-PL combination. In this method, PLs and insulin powder were co-dissolved in 1 ml of dimethyl sulfoxide (DMSO) containing 5% glacial acetic acid while stirring it gently until a clear mixture was formed. After that, the homogeneous solution was freeze-dried over night at -40°C and 10 Pa of vacuum. The resulting complex was nitrogen-flushed and kept at 4°C for storage.

Solvent Evaporation method

The drug is first acidified in the solvent evaporation process of making pharmacosomes so that the Active hydrogen can be readily available for complexation. After that, chloroform is used to extract the drug acid, which is then crystallized again. The drug-PC complex is made by mixing PC and drug acid in different molar ratios. The PC and drug acid are precisely weighed and then added to a 100 ml round bottom flask with enough

dichloromethane to dissolve them. One hour is utilized for refluxing the mixture. The solvent is then evaporated out in a rotary vacuum evaporator at 40°C while under vacuum. After collection, the dried residues are placed in avacuum desiccator for complete drying.

Micro fluidization
Micro fluidization is a relatively new method for organizing micro MLVS. The fluid is pumped through a screen at an extremely high pressure (10,000 psi) using a tiny fluidizer.

Reverse section separation
In lipid: pharmacosome a can also cure liver disorder and as liver protective agent, oil: they provide choline from phospholipids. Due to the presence of the phospholipids pharmacosomes can even encourage collagen degradation and prevent fibrotic scarring and hepatitis. Additionally it offers defense against infectious hepatitis A, B, C and provide supports for conditions resembling senile dementia.

Pharmacosomes Preparation
In order to provide an active hydrogen site for complexation, the drug salt was changed into an acidic state. Drug acid was created by acidifying a drug salt's aqueous solution, extracting it with chloroform, and then recrystallizing it. By combining drug acid with a concentration of PC that is equimolar, a drug-PC complex was created. In a flask with a circular bottom, pc and drug acid were placed in an equimolar concentration and dissolved in dichloromethane. In a rotary vacuum evaporator operating at 40°C, the solvent was evaporated under vacuum. The pharmacosomes were extracted from the dried residue and overnight dried in a vacuum desiccator before being characterized.

Characterization
Stability of pharmacosome
The stability of the system is assessed by comparing the spectrum of a complex at different periods in time in the solid state with the spectrum of dispersion in water composed of tiny particles.

Complex determination
The correlation spectrum between the spectrum of the discrete constituent and that of the complex sample, as well as the spectrum of their combination, can be used to determine the creation of the complex and conjugate.

FTIR spectroscopy
By comparing the spectrum of the complex with the spectra of the individual componentsand their mechanical combination, IR spectroscopy can establish the complex's formation. By contrasting the spectrum of the complex in solid form with the spectrum of its micro dispersion in water after lyophilization, at various time intervals, it is possible to assess the stability of a pharmacosome.

Surface morphology
The surface morphology of the pharmacosomes can be studied using transmission electronmicroscopy (TEM) or scanning electron microscopy (SEM).The size and shape of the pharmacosomes were influenced by the purity levels of the phospholipids, the technique used, and process variables like the speed of rotation. Phospholipids are 80% pure and produce oily products and high-grade lipids that are susceptible to oxidative breakdown.

Solubility studies
The solubility consideration of the medication, phospholipids, their physical combination, and consequently the pharmacosomes are taken into account in order to accomplish desired characteristics of absorption and bioavailability. The shake flash method, which involves mutually saturating two phases (aqueous and phases), can be used to obtain the apparent partition coefficient. A suitable method, such as HPLC or UV spectrophotometer, can be used to determine the concentration of the drug after thoroughly mixing both the phases in equal volume, namely the aqueous phase as buffer solutions (having a pH range from 2.0 to 7.4) and the oily phase as 1-octanol-containing phospholipids complex.

Drug content
Complex is equivalent to drug was weighed and placed into volumetric flask with phosphate buffer in order to estimate the drug content in drug-pc complex. Then a magnetic stirrer wasused to stir a volumetric flask for 24 hours. After 24 hours, an appropriate dilution was created, and the drug content was assessed at 276nm UV dedicated to photometrically.

Microscopical images
Pharmacosome dispersion was applied, and it was viewed under the microscope. Circular, single-layered vesicle bodies were visible at a magnification of 45 times.

In vitro drug release rate
The reverse dialysis bag method is employed. This approach involves introducing pharmacosomes into a dialysis bag holding the continuous phase, suspending them in a vessel containing the donor phase, and stirring the mixture periodically. The dialysis bag is taken out, and the inside is examined for drug release.

Determination of entrapment efficiency
With the aid of centrisort tubes, the free drug in the aqueous phase was separated by ultra- filtration. The HPLC method was used to measure the amount of levodopa in the aqueous phase. Total drug – Free drug/Total drug*100 is the entrapment efficiency.

X-ray diffraction
X-ray powder diffraction (XRPD) research was carried out to determine whether the alterations in the diclofenac crystal shape are consistent with a polymorphic

transaction and to investigate the solid state of the diclofenac PL complex. Using these patterns as a guide, the relative integrated intensity of reflection peaks throughout the specified range of reflecting angle, might be used to assess the 2θ degree of crystallinity. The integrated intensity is represented by the area under the curves of the XRPD patterns, and the value of2θ denotes the diffraction angle of the ray beams. It also denotes the properties of the material. When Sematly et al. prepared the diclofenac PL complexes, they discovered that there were no crystalline peaks in the XRPD of the diclofenac complex that were present in the diclofenac itself. Consequently, the loss of diclofenac crystalline.

Drug liquid compatibility

As certain drug-lipid compatibility and potential interactions is differential scanning calorimetry. Separate samples are heated in a closed sample pan in order to study the thermal reaction. The nitrogen gas is expelled, and with a particular heating rate, the temperature is kept within a predetermined range.

Crystalline structure Management

The X-ray diffraction technique can be used to determine whether a medication is crystalline. In the X ray generator, the tube voltages and current can be adjusted. Radiation may be emitted by copper lines. One can control the scan angle. The area under curve of the X-ray powder diffraction pattern, which identifies the characteristics of the specimen, projects the total combined intensity of all reflection peaks.

Differential scanning calorimetry

Utilising a 2910 modulated differential scanning calorimeter v4.4E, the drug-Pc complex, drug-phosphatidylcholine (80%), and drug acid thermograms were captured. By heating 2.0 ± 0.2 mg of each individual sample in a covered sample pan with nitrogen gas flow, the thermal behaviour was investigated. The studies were conducted between the temperatures of 25 and 250° with a heating rate of 1.

Application

- To investigate the biological components like proteins and amino acids' effectiveness for transportation.
- Increased pharmacokinetic and pharmacodynamic activities are shown by phytoconstituents including flavanoids, glycosides, Xanthones and by others.
- The method has been beneficial in enhancing the therapeutic performance of different medications. Specifically, acyclovir, taxol, and pindolomate.
- Pharmacosomes have greater stable storage.
- When vesicular and micellar interactions occur, they have a substantial impact on the temperature of pharmacosomes during their phase transition and interact with their bimembranes to improve the transfer of active ingredients.
- When biomembranes interact, the phase transition temperature of those materials changes, improving the fluidity of the menstruum and enhancing permeations.
- The methods successfully enhance the therapeutic, efficiency, and various drugs like amoxicillin, pindolo diglyceride etc.
- Acyclovir pharmacosomes were created and it was shown that the blood's plasma proteinsabsorbed both of them interfered with the manner in which erythrocytes interacted with one another, reducing their effectiveness and Cytotoxic response.
- Pharmacosomes can improve the absorption and transportation of drugs. Yue and colleagues enhanced the Geniposide pharmacosome formulation and looked at its attributes using response surface design. The temperature of the reaction mixture, the phospholipid to drug ratio, and the concentration of the medication have been determined to be 3, 500C and 5.5mg/mL, respectively.
- Pharmacosomes can increase the rate of permeation. During the change the delivery of drugs across membranes may be improved by the temperature of vesicles in the form of vesicles and micelles since it may have a clear impact of how they interact with the biomembrane.
- Pharmacosomes can be used to study the mechanisms of action of medications and non-bilayer phases.
- Drugs such as NSAIDs, antifungal, hypotensive, antiviral, diuretics, and nucleic acids among others can be included in the manufacture of pharmacosomes.
- In the preparation of pharmacosomes, PEGylation and biotinylation are currently employedin study.
- Diclofenac's solubility was shown to be improved in Pharmacosomes (22.1 g/mL) as compared to diclofenac (10.5g/mL) in Semalty et al.'s study on the development of the drug. After 10 hours of dissolving examination, drug release increased from 60.4% of diclofenac to 87.8% of diclofenac pharmacosomes. Diclofenac pharmacosomes possessed a drug content of 96.2 ± 1% as measured.
- The capacity of pharmacosomes to carry biological components like proteins and aminoacids.
- Enhancing the production of 20(S)-protopanaxadiol pharmacosomes revealed pharmacosome encapsulation efficacy.
- In the case of diclofenac and aceclofenac, pharmacosomes were found to increase the drug's solubility and permeability beyond the range of conventional dosage forms.
- Tetra hydro furan injection approach observed that pharmacosomes have a prolonged release effect on target tissue that targets the liver.
- The macrophage targeting and permeability of isoniazid pharmacosomes were enhanced.

Salient Features

- Hydrolysis, particularly enzymatic hydrolysis, is used to liberate the medication from the

pharmacosome. Low HDL solubilization and decreased phosphorus transfer /exchange. Drug information into the fatty acid is not a concern.

- The entrapped volume and drug bilayer interactions in the pharmacosome have little bearing on the effectiveness of entrapment. However, in the case of liposomes, these parameters have a significant impact on entrapment efficiency.
- Due to their dual affinity for fat and water, they can easily pass through the pores of cells, barriers, or organs when exocytosed or endocytosed, respectively.
- Because of covalent bond between the medication and phosphorous, drug leakage can beprevented.
- Their rate of breakdown into active drug molecules after absorption is greatly influenced by the dimensions and functional components of the drug molecule, the length of the lipid chain, and the spacer. For optimum in vivo pharmacokinetics, they can be changed rather accurately.
- The fact that the drug itself produces vesicles when combined with lipids means that the effectiveness of entrapment is not only high but also predefined.
- Contrary to liposomes, the tedious, time-consuming step of removing the free, unentrapped medication from the formulation is not necessary.
- Since the medicine is covalently bonded, there is no loss from drug leakage.
- The stability of the entire system is controlled by the physical and chemical characteristics of the conjugate.
- The fluidity of the liposome membrane, which in turn affects the rate of drug release and the system's physical stability, is determined by their lipid content. However, because the drug is covalently bonded to the lipids in pharmacosomes, the release rate is unaffected bythe phase transition temperature of the drug lipid complex.
- It is given orally, topically or IV.
- Drug incorporation into the lipids is not a concern.

Marketed Preparation

Pharmacosomes produces low molecular weight iron dextran, which is human iron dextran. Since it is the only injectable iron solution available, CosmoFer® gives customers the optionof replacing their iron levels through total dosage iron infusion, intravenous, and intramuscular injection. Piglets are given veterinary iron dextran as an iron supplement to avoid anemia due to iron deficiency. Products containing the medication Uniferon® Iron Dextran are sold internationally. Pharmacosomes produces dextran polymers in accordance with good manufacturing practices (GMP). Clinical-grade Dextran, reagent-grade Dextran, and GPC Standards for GPC chromatography are some of our available Dextran items.

Future Prospective

The medications are administered in an appropriate formulation that takes into account factors such as safety, efficacy, and acceptability, among others. This formulation is frequently referred to as a dosage form or drug delivery system. As science and technology have advanced across many fields, dosage forms have changed from straight forward mixtures and pills to extremely sophisticated, technology-intensive drug delivery systems known as Novel Drug Delivery Systems (NDDS). Because the New substance Delivery System(NDDS) has several advantages over the traditional dose form, it has received renewed inspiration since the early 1980s for improving therapeutic outcomes from the same substance. Since then, a number of NDDS have been created, making up a sizeable percentage of the global market. Since the early 1980s, Indian researchers have changed their focus to NDDS. The clear clinical benefits of these systems and their financial benefits served as the primary impetus for the development of NDDS. The NDDS are being created in order to have more control over the pharmacokinetics and pharmacodynamic of a drug after administration, resulting in dosage forms that are safer, more efficient, and superior tothose found in the market today. Reformulating an outdated drug into an NDDS frequently increases clinical interest in the medication, extending its useful market life. This brings up NDDS's economic features. With NDDS, comparatively less time and money spent could result in larger profit margins while utilizing the benefits of patent protection. It is simpler to create an NDDS. A firm can submit an Abbreviated novel Drug Application (ANDA) to the USFDA more readily than a novel molecule. Some Indian businesses have already achieved success in this field.

Enhanced Therapeutic Activity

The method has effectively enhanced the medical Activity of numerous medications, including taxol, acyclovir, pindolol maleate, and bupronolol hydrochloride. Zhang and Wang demonstrated the potential of pharmacosomes. A drug capacity to pass BBB. Another study examined in the vivo response of didanosine pharmacosome in rats. The study releaved liver targeting and sustained release in rats, after iv administered. Additionally it was delivered that the spleen and lung were targeted and that drug elimination from the tissue targeted tissue was delayed. Additionally, it has been suggested that NSAIDs and phospholipids be combined to increase the GI safety of these medications. It has been noted that thepresence of a complex between the NSAID and PC speed of the diffusion of MASS over lipid barrier and into a desired cells. Therefore, creating the medication as fatty acid compounds (pharmacy some) mayprove to be useful strategy for increasing solubility and reducing NSAIDs of GI tract impact.

Research Update on Pharmacosomes

Numerous researches have demonstrated that pharmacosomes can improve the non-steroidal anti-inflammatory drug's (NSAID) dissolving properties. When compared to the solubility of diclofenac 12 (10.5mg ml-1), the solubility of the diclofenac phosphatidylcholine (80%)complex was Increased to

22.1mg ml-1.The solvent evaporation method was also used to generate aceclofenac 13 loaded pharmacosomes, which demonstrated a release rate of 79.78% after 4 hours. Pharmacosomes that were loaded with aspirin 14 and naringenin 15 showed comparable outcomes. The capacity of the pharmacosomes to increase solubility was demonstrated in later research on the dioleylphosphatidylcholine (DOPC) complex of ketoprofen (KO) by Garcia et al. When in vitro percutaneous absorption was evaluated in the complex utilizing a flow-through diffusion cell, the drug's skin penetration was also improved. Hamann JIN and Muller-Goymann Using a modified method that included diluting lyotropic liquid crystals of amphiphilic pharmaceuticals, Yi-Guang et al. synthesized fenoprofen pharmacosomes. Acyclovir succinyl glyceryl monostearate nanoscale pharmacosomes were created using the Tetrahydrofuran injection technique. For the examination of developed complex using transmission electron microscope and laser scattering method. While freezing and lyophilization damaged the structure of the pharmacosomes, centrifugation and heating showed only a very slight impact on the stability of the substance. Pharmacosomes were discovered to be absorbed by blood plasma proteins in vivo, lowering the hemolytic reaction. By using a straightforward thin film-dispersion preparation, Meihua HAN et al. created the 20(S)-Protopanaxadiol (Ppd) Pharmacosome, which was proven to have stable properties. A small number of researchers have also claimed that the isoniazid pharmacosomes strengthened Macrophage targeting and permeability. An anhydrous co-solvent lyophilization method was used by Shi et al. to create a novel insulin-phospholipid complex. When insulin was complexed with phospholipids, its physicochemical characteristics were markedly different from those of natural insulin. It was determined that the traits, particularly the enhanced lipophilicity,would improve insulin oral absorption.

Expert Opinion

Drugs with a low bioavailability can be made more effective. By creating their PL complexes, assumed their absorption is dissolution or penetration rate restricted. The PLs are an excellent natural carrier and have their own medicinal benefits. The preparation of zwitterionic, amphiphilic molecules may enhance the bioavailability of a variety of medications, including insulin, salmon calcitonin, NSAIDs,and others. The diffusion of NSAIDs over lipid membranes and into target cells is increased by the formation of NSAID pharmacosomes. The pharmacosomes may potentially lessen the GI toxicity of NSAIDs. The biopharmaceutical activity of physiologically active phytoconstituents including flavones, glycosides, xanthones, and other compounds may also be enhanced by comparable PL complexes. Pharmacosomes serve a significant role in the targeted delivery of different medications and their selective targeting, identical to other vesicular systems. Pharmacosomes are able to generate even better results due to the development of contemporary procedures like supercritical fluid and lyophilization technologies. The poor biopharmaceutical qualities on a lot of herbal or synthetic medications are often reported to be the only factor limiting their bioavailability. As a result, the pharmacosomes can serve as simple, safe, effective, and stable drug delivery systems that can be created using straightforward and repeatable procedures for improved therapeutic performance.

Physicochemical Stability of Pharmacosome

The size, size distribution and entrapment efficiency, in vitro release rate, stability studies are the different attributes characters of pharmacosome. The drugs like Pindolol maleate, Bupranolol Hydrochloride, Taxol, acyclovir are the improved medicinal performance. The role of various electrolyte media on the physicochemical stability of bupronolol hydrochloride pharmacosomes was investigated by Kaiser. Spontaneous aggregation was noted because the polar hydrophilic group is highly reactive to various electrolyte. Depending on the electrolyte's valency, at varying concentrations. However the aggregation in absence of electrolytes is mild and to insignificant. 5% of glucose was discovered to the best candidates for isotonization. According to the Yang et al. found that the dimension in size and eventually from miscelles are COP-Diacyl prodrug early forms big vesicle.In order to give stability to the lipid bilayer and prevent the rapid interchange of lipids between membranes of living cells, they demonstrate that slow kinetics are a crucial prerequisite for phospholipid on bimembrane. Pharmacosomes in the vesicular and micellar states may interact differently with membranes depending on the phase transition temperature. Pharmacosomes and bimembranes can interact to improve the transport of active ingredients, changing the phase transition. Bimembranes' temperature increases the fluidity of the membrane, enhancing permeations.

CONCLUSION

Pharmacosomes are an extremely effective tool for drug administration in the therapeutic regimen for a variety of complications and have the potential to offer a more effective course of treatment than traditional drug-delivery platforms. Pharmacosomes are able to overcome some of the drawbacks of liposomes, niosomes, and transferosomes, such as oxidation, instability, and lack of purity. Pharmacosomes have the capacity to entrap hydrophilic or lipophilic medicines and release them at the site of action. They can be used to increase the water solubility and permeability of lipophilic and hydrophilic drugs.It may be administered orally, topically, or intravenously. Covalent, Vanderwaal, and hydrogen bonds are used to bind the drug to the lipid in pharmacosomes. The drug indicates Excellent trapping efficiency, and there is Minimal Loss of medication through Leakage. Comparable to other vesicular drug delivery systems.

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