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Review Article

Zahraei Method of a new Pharmaceutical Coating

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Abstract

coating may be a common step in tablet manufacture which will be wont to improve product appearance, organoleptic properties, or to facilitate swallowing. In addition, it can improve the physical and chemical stability of dosage forms, and modify the release characteristics of the drug. In this article, we examine the coating of the pill, which not only covers the area around the tablet and its contents, but also the veins connecting the outer coating and makes the bitter taste of the drug not be felt.

Key words: medial meniscus; fibrochondrocyte; kartogenin

Modern Definition of Drug

The problem to define the word Drug accurately and precisely remains under the controversy and a challenging one ahead of medicinal scientists and pharmacists. The introduction of computers to the sector of drug discovery and research need more accurate and precise definitions to the elemental terms used for programming [1]. The term Drug is found defined in some ways in many available literatures of medicinal chemistry. One definition is that a pharmaceutical agent that features a desired biological effect on the living system. This definition isn't complete as there exists a probability that a pharmaceutical agent can act with biological system both constructively during a good manner and adversely during a bad manner giving the likelihood for both the great and Bad Drugs and which itself is sort of confusing [2]. Even the great drugs also are found distinctly dangerous in some cases. For example Morphine an excellent analgesic, Barbiturates used for general anaesthesia are good drugs but with serious side effects and bad drugs like Heroine which is still being used in limited doses under strict control in critical stages of cancer to beat Depression with a euphoric effect [3]. Thus the definition becomes irrelevant at many times. This cause a replacement modified definition for the concept called drug as chemicals that interact with a biological system to supply a biological response. Still the confusing problem gives headache to the drug designing and discovery people that concentrate more on the computational solutions that require apt defining and controlling rules [4]. The modified modern definition of drug is that chemicals that prevent disease or assist in restoring health to diseased individuals. This definition is additionally lacking in certain aspects like health tonics which can't be included as they're prescribed for the healthy individuals. This definition is one among the foremost comparable one with the traditional Ayurvedic definition, but the concept also including the heath tonics [1, 5].

Drug design

Drug design, often mentioned as rational drug design or simply rational design, is that the inventive process of finding new medications supported the knowledge of a biological target [6]. In general, modeling approaches are categorized into structure-based and ligand-based methods (Fig. 1). The drug is most commonly an organic small molecule that activates or inhibits the function of a biomolecule sort of a protein, which successively results in a therapeutic benefit to the patient. In the most straightforward sense, drug design involves the design of molecules that are complementary in shape and charge to the biomolecular target with which they interact and thus will bind to it. Drug design frequently but not necessarily relies on computer modeling techniques [7].this sort of modeling is usually mentioned as computer-aided drug design. Finally, drug design that relies on the knowledge of the three-dimensional structure of the biomolecular target is understood as structure-

based drug design [7].additionally to small molecules, biopharmaceuticals including peptides [8, 9] and especially therapeutic antibodies are an increasingly important class of medicine and computational methods for improving the affinity, selectivity, and stability of those protein-based therapeutics have also been developed [10]. The phrase "drug design" is to some extent a misnomer. A more accurate term is ligand design (i.e., design of a molecule which will bind tightly to its target) [11].Although design techniques for prediction of binding affinity are reasonably successful, there are many other properties, like bioavailability, metabolic half-life, side effects, etc., that first must be optimized before a ligand can become a secure and efficacious drug. These other characteristics are often difficult to predict with rational design techniques. Nevertheless, thanks to high attrition rates, especially during clinical phases of drug development, more attention is being focused early within the drug design process on selecting candidate drugs whose physicochemical properties are predicted to end in fewer complications during development and hence more likely to steer to an approved, marketed drug [12].Furthermore, in vitro experiments complemented with computation methods are increasingly utilized in early drug discovery to pick compounds with more favorable ADME (absorption, distribution, metabolism, and excretion) and toxicological profiles [13].

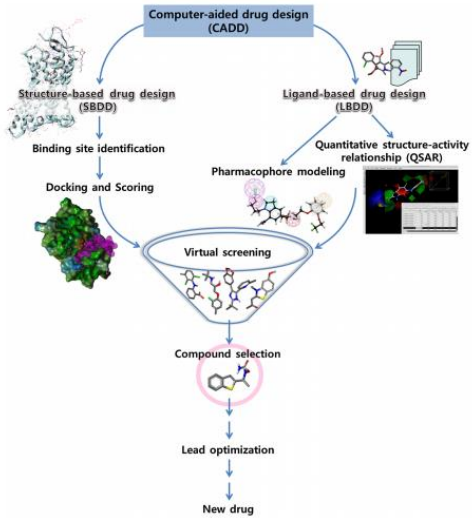


Figure 1: Representative workflow for computer-aided drug design [14].

Types of drug forms

Drug forms are tools that deliver drug molecules to the site of action. The pharmacological effect of the drug is related to the concentration of the drug from the site of action, which includes toxic and side effects and therapeutic and beneficial effects. The goal of successful drug treatment is to bring the right concentration of the drug to the right place so that the maximum therapeutic effect and the least toxicity are achieved. The following is a brief description of the different forms of medication that are prescribed to patients. All forms of medicine must be free of microbial contamination and the required standards must be met.

Classification of drugs

Types of physical forms of drugs: solid, semi-solid, gaseous and liquid

Types of administration methods: oral, topical, anal, injectable, vaginal, inhaled, ocular, ear

Solid pharmaceutical forms The compressed form of the drug is oral and is round, oval or square. This form of medicine is prepared by molding or compression method.

A variety of drug administration methods

i. Oral method: in solid and liquid form
ii. Method of injection: such as ampoules and vials
iii. Inhalation method: such as spraying and inhaling
iv. Topical method: such as ointments, creams, drops and shampoos
v. Skin method: such as skin glue
vi. Intrarectal and vaginal methods: such as suppositories, vaginal tablets

Solid pharmaceutical forms for oral use

Solid oral forms of medicine are among the most widely used forms of medicine. Ease of transportation and consumption, lower price compared to other forms of the same drug and no need for experienced manpower to consume them are their advantages.

i. Powders

Powders or are fine particles of a drug that have not been specifically treated. Powders are sometimes used for external purposes. For oral use, they are dissolved in liquids when consumed. Disadvantages of this form of medicine are the lack of opacity of the taste of the drug and the lack of protection of the drug against unstable agents (such as moisture and oxygen).

ii. Granules

The granules are obtained by sticking the powders together (2mm-2.0 in diameter). The granules are more stable than the powders (due to the lower contact surface with air) and easier solubility. Lack of opacity of drug taste is one of the disadvantages of granules. The granules are packed in sachets in a single dose. Some granules should be poured on the tongue and swallowed with water and others should be dissolved in water before use.

iii. Capsules

The shell capsule is made of gelatin, which contains the drug substance. Gelatin is insoluble in cold water, but can absorb up to 10 times its own weight in water. Therefore, in the presence of saliva, it softens and slips very quickly. That is why it is easier to swallow the capsule than the pill. The gelatin melts at 37 ° C, so the capsule melts in the stomach and the drug is released. Capsules can absorb moisture in a humid environment and lose water in the shell in a dry environment. For this reason, capsules should be avoided in both humid and hot and dry environments. In humid environments, the capsule may deform and it is also possible for the material inside the capsule to decompose. In hot and dry environments, the capsule becomes very brittle and may spill some of the substance when

consumed, so that less medicine reaches the body and the taste of the medicine is felt. The capsules stick to each other if placed together and sometimes it is not possible to separate them. Compared to pills, more active ingredient can be placed in capsules. Odor and taste concealment of the drug are the advantages of the capsules. Capsules should be swallowed whole with plenty of water.

iv. Tablets

Tablets are solid drug forms that result from the compression of fine particles by one or more drugs and additives. Each pill contains a single dose of medication. Pills are the most widely used form of medication. Inflexibility in the dosage of drugs is one of the most important disadvantages of pills. To deal with this problem, in many cases, multiple tablets are made for a drug in different amounts. Sometimes by placing one or two grooves on the tablet, it is possible to divide it into 1.2 or 1.4. These pills are called scored tablets.

a. Compressed tablets: These tablets are made by simply squeezing the raw materials. Drugs are prepared in such a way that they do not smell bad and are not sensitive to destabilizing agents.
b. tablets compressed Multiple: This type of tablet is either compressed in two separate layers or one tablet is placed inside another tablet.
c. tablets coated Sugar: In this type of tablets, the central core is covered with syrup and a colored coating is placed on this sugar coating. In this form of medicine, the taste and smell of the medicine are not felt and the medicine is protected against light and partially against moisture. Sugar-coated tablets are colorful and have a beautiful appearance, so they are one of the most common forms of drug poisoning in children. The laborious and time-consuming construction of these pills is one of their disadvantages. Sugar coated tablets are abbreviated as S.C. These pills are also called dragees.
d. tablets coated Film: In this type of tablets, a thin layer of polymer is drawn on the central core. Their benefits are similar to those with sugar-coated tablets. Because a number of drugs (such as chlorpromazine) cause dermatitis following repeated skin contact, they are also produced in this form. tablets coated Film usually do not look good. These pills are abbreviated as F.C.
e. tablets coated Enteric: In this type of tablets, the tablet coating is insoluble in acidic pH and soluble in alkaline pH, so these tablets open in the intestine. Drugs that are degraded in the acidic environment of the stomach (such as digestive enzymes used to treat indigestion or stomach stimulants) are prepared in this form. Tablets with a soluble coated Enteric are abbreviated as E.C.
f. Sublingual tablets: Prepare drugs sublingually that are either widely broken down by stomach acid or extensively metabolized by gastrointestinal and liver enzymes. Due to the fact that the drug in this form of the drug is absorbed by the capillaries under the tongue and eventually reaches the large venous artery, it is practically out of reach of the above-mentioned factors. Another advantage of this form of medicine is its rapid effect.
g. Chewable tablets: These tablets should be chewed while taking. These pills are soft and contain flavoring substances. They make drugs in such a way that they must be opened inside the stomach and at the entrance to it. These include pills used to neutralize stomach acid and anti-flatulence drugs.
h. Effervescent tablets: Pills that contain tartaric acid, citric acid and sodium bicarbonate in addition to the active ingredient. When taking these tablets, they are placed in water. The presence of the above substances with water releases carbon dioxide (CO_2). In addition to disintegrating the tablet, the released gas creates a favorable taste and masks the unpleasant taste, especially the salty taste. Effervescent tablets are great for encouraging children to take medicine. Effervescent tablets are highly sensitive to moisture.
i. Sustained tablets: Sustained tablets or long-acting tablets are tablets that release a drug substance continuously and over a longer period of time due to a special process performed on them. The advantages of these pills are: 1) reducing the frequency of drug use and increasing patient acceptance 2) being economical 3) reducing side effects due to less changes in blood concentration of the drug. Sustained tablets are abbreviated RS and are also called Retard [15].

Tablet Coating

Tablets are among the foremost convenient and preferred oral dosage forms due to their many advantages, including simple administration, high patient compliance, and cost effectiveness. Among the multiple steps in pharmaceutical manufacturing of tablets, coating may be a critical process that's often used for functional and aesthetic reasons [1]. Among three types of tablet-coating processes

1. sugar coating,
2. film coating, and
3. press coating (ENTERIC COATING)

Film coating is the most widely used approach to solve various issues encountered during manufacturing, transport, storage, and clinical use of drug products [16, 17].

Objectives of tablet coating

a. To mask the bitter taste and unpleasant odour of some drugs
b. To improve product appearance for aesthetic or commercial purposes (aiding in brand identification)
c. To prevent drug induced irritation at a specific site within the gastrointestinal tract, e.g. the stomach for nonsteroidal anti-inflammatory drugs (NSAIDs).
d. To protect the drug from the external environment (particularly air, moisture, and light) in order to improve stability.
e. To enhance ease of swallowing large dosage forms
f. To facilitate handling, particularly in high speed packaging/filling lines, and automated counters in pharmacies, where the coating minimizes cross contamination due to dust elimination.
g. To facilitate rapid identification of a product by the manufacturer, the dispensing pharmacist and the patient.
h. To reduce the risk of interaction between incompatible materials
i. To retard loss of volatile ingredients
j. To modify and/or control the rate of drug release as in repeat-action, delayed-release (enteric-coated) and sustained-release products.
k. To control the site of action of drugs e.g., colon delivery
l. To avoid inactivation of drug in the stomach e.g., enteric coating [1618].

Film coating

Modern pharmaceutical coating began within the 19th century1 with sugar coating, which was mainly wont to increase the palatability of bitter medicaments. Sugar coating features a long time interval (up to five days), a high level of required operator expertise, and difficulty in standardizing the procedure. The possibility of bacterial and mold growth in sugar solutions, sealing the tablets before coating, restrictions in tablet shape, and a scarcity of automation within the process led to the search for alternative coating methods [16].

The introduction of film coating greatly reduced the processing time [17].

Film layer may be formed from either polymeric solution (organic solvent or aqueous based) or aqueous polymeric dispersion (commonly called latex). Polymer is that the main ingredient within the majority of film-coated

formulations, and it's going to be from different (natural, synthetic or semi synthetic) origins, including cellulosics, acrylics, vinyl, and combination polymers [18, 19]. Natural polymers have advantages over synthetic and semi synthetic polymers in that they are cheap and easily available, nonirritant, biodegradable, biocompatible, and ecofriendly [20].

Aqueous film coating has largely supplanted solvent based film coating. The use of water as a solvent eliminates many of the disadvantages associated with organic solvent based coating techniques [21]. However, heat is required in aqueous based systems to evaporate the water present within the coating. For aqueous film-coating systems, the slow drying rate of the coating is a problem due to the relatively high latent heat of vaporization (539.4 cal/g) of water [22]. Thus, the aqueous film-coating time interval are often longer than solvent based coating.

The most commonly used aqueous soluble polymers consist of [23]:

A. Acrylate copolymer: Eudragit E (cationic copolymer supported dimethyaminoethylmethacrylate and other neutral 2methylpropenoic acid Esters), Rohm Pharma GmbH, Darmstadt, West Germany. B. Cellulosic polymers:

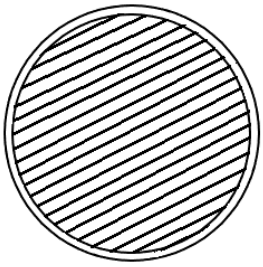
1. Carboxymethylcellulose sodium, USP
2. Hydroxypropylcellulose, NF
3. Hydroxypropylmethylcellulose, USP [HPMC]
4. Methylcellulose, USP
5. Polyethyleneglycols, NF
6. Povidone, USP

Method

In this method, the coated part on the surface of the tablet does not only cover the perimeter of the tablet and its contents, Rather, it is a lattice and the streak connecting the outer covering come in different shapes.

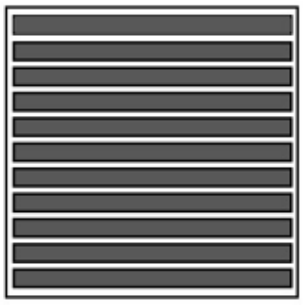
Drug content is placed between these veins and connections.

See the example below.



You can see the drug section and the coat section just like the tablets on the market.

Due to the presence of a flavored surface layer, at first we do not notice the bitter taste of the drug, but by passing through the first layer, an unpleasant taste appears, but in this method, according to the following shapes (the shapes that we made the connections and veins) Paying attention to the idea of a three-dimensional state and creating enough space for the drug content, the connecting streak of the surrounding coating will cause the bitter taste of the drug to not be felt constantly.



Conclusion

Moreover, this paper highlighted the new coating tablets that connecting streak of the surrounding coating will cause the bitter taste of the drug to not be felt constantly.

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