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Short Communication

Extrusion Approach for Improved Computational Dosage Form Design

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DESCRIPTION

Dosage form design is a critical aspect of pharmaceutical development, as it determines how a drug will be administered to a patient. The selection of a dosage form is based on various factors such as the physicochemical properties of the drug, the intended route of administration, the desired onset and duration of action, and the patient's characteristics. A well-designed dosage form should provide accurate dosing, ease of administration, safety, stability, and good patient compliance.

The primary objective of dosage form design is to ensure that the drug is delivered to the site of action in an effective and efficient manner. The design of the dosage form should optimize drug bioavailability, which refers to the fraction of the drug that reaches systemic circulation after administration. The bioavailability of a drug can be affected by several factors, such as the drug's solubility, particle size, stability, and formulation [1]. Therefore, it is essential to choose the appropriate dosage form that can overcome these challenges.

The most common dosage forms used in pharmaceuticals include tablets, capsules, injections, patches, and topical formulations. Tablets are solid dosage forms that are made by compressing the drug and excipients into a compact form [2]. Tablets are convenient to use, have a long shelf life, and are easy to manufacture. However, the drug's solubility, stability, and absorption can be affected by the tablet's disintegration and dissolution properties. Therefore, the tablet formulation should be optimized to ensure rapid disintegration and dissolution in the gastrointestinal tract. Capsules are another popular dosage form that consists of a shell enclosing the drug and excipients. Capsules can be designed to release the drug immediately or in a controlled manner, depending on the drug's properties and the desired therapeutic effect [3]. Controlled-release capsules are designed to maintain the drug concentration within the therapeutic window for an extended period, leading to a sustained effect and reduced dosing frequency.

Injections are a parenteral dosage form that delivers the drug directly into the bloodstream. Injections are commonly used for drugs that have poor oral bioavailability, a short half-life, or a narrow therapeutic index. Injections can be administered intravenously, intramuscularly, or subcutaneously, depending on the drug's characteristics and the desired pharmacokinetic profile [4]. The injectable formulation should be sterile, stable, and free from particulate matter to minimize the risk of infection and other adverse effects. Differences in drug bioavailability and fate in patients between apparently similar formulations and possible causative reasons should be considered [5].

Therefore, in recent years there has been an interest in eliminating variability in bioavailability properties, especially in drugs containing doses comparable to the active ingredient, as it has been recognized that formulation factors can influence therapeutic performance [6]. Careful selection of the most appropriate chemical form of a drug is often necessary to optimize drug bioavailability. For example, such selection takes into consideration solubility requirements, drug particle size and physical form requirements, and appropriate excipients and processing aids, in conjunction with the selection of the most appropriate route of administration and dosage form.

Patches are transdermal dosage forms that deliver the drug through the skin. Patches are convenient to use and can provide a constant drug concentration over an extended period. Patches are commonly used for drugs that have a high first-pass metabolism, a short half-life, or a narrow therapeutic index. However, the drug's absorption through the skin can be affected by several factors, such as the thickness and condition of the skin and the drug's physicochemical properties. Topical formulations are dosage forms that are applied to the skin or mucous membranes. Topical formulations are commonly used for drugs that act locally, such as creams, ointments, and gels [7]. Topical formulations should be designed to ensure adequate penetration of the drug into the skin or mucous membrane and minimize the risk of local and systemic adverse effects.

The selection of a dosage form should consider the patient's characteristics, such as age, gender, and medical history. For example, pediatric patients may have difficulty swallowing tablets or capsules, and therefore, liquid or chewable formulations may be more appropriate. Elderly patients may have reduced gastrointestinal motility and absorption, leading to altered drug

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bioavailability. Therefore, dosage forms that can overcome these challenges should be considered [8].

There are many different forms in which medicines can be placed for the convenient and effective treatment of ailments. Most commonly, manufacturers produce drug substances in multiple dosage forms and strengths for effective and convenient treatment of disease. For infants under 5 years of age, pharmaceutical liquids are preferred. This may be the case if young patients have vigorous coughing and vomiting, or are simply defiant. In such cases, an injection may be required. Children and even adults may have trouble swallowing solids forms, especially uncoated tablets. For this reason, some drugs are prescribed as chewable tablets.

CONCLUSION

A well-designed dosage form should be easy to use, convenient, and acceptable to the patient. Patient compliance can be affected by several factors. Before formulating the drug substance into the desired dosage form, a product type must be determined, and then various starting formulations. Patient compliance is a crucial factor in the success of drug therapy. Additionally, proper manufacturing processes, labeling, and packaging are required.

REFERENCES

1. Balan G, Timmins P, Greene DS, Marathe PH. *In-vitro in-vivo* correlation models for glibenclamide after administration of metformin/glibenclamide tablets to healthy human volunteers. J Pharm Pharmacol. 2000;52(7):831-838.
2. Eroglu H, Burul-Bozkurt N, Uma S, Oner L. Preparation and *in vitro/in vivo* evaluation of microparticle formulations containing meloxicam. AAPS PharmSciTech. 2012;13(1):46-52.
3. Khaled AA, Pervaiz K, Karim S, Farzana K, Murtaza G. Development of *in vitro–in vivo* correlation for encapsulated metoprolol tartrate. Acta Pol Pharm. 2013;70(4):743-747.
4. Ostrowski M, Wilkowska E, Baczek T. *In vivo–in vitro* correlation for amoxicillin trihydrate 1000 mg dispersible tablet. Drug Dev Ind Pharm. 2009;35(8):981-985.
5. Sirisuth N, Augsburger LL, Eddington ND. Development and validation of a non-linear IVIVC model for a diltiazem extended release formulation. Biopharm Drug Dispos. 2002;23(1):1-8.
6. Mudie DM, Shi Y, Ping H, Gao P, Amidon GL, Amidon GE. Mechanistic analysis of solute transport in an *in vitro* physiological two-phase dissolution apparatus. Biopharm Drug Dispos. 2012;33:378-402.
7. Chowdhury AK, Islam S. *In vitro-in vivo* correlation as a surrogate for bioequivalence testing: the current state of play. Asian J Pharm Sci. 2011;6:176-190.
8. Shah VP, Konecny JJ, Everett RL, McCullough B, Noorizadeh AC, Skelly JP. *In vitro* dissolution profile of water-insoluble drug dosage forms in the presence of surfactants. Pharm Res. 1989;6(7):612-618.