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Understanding the Drug Dissolution and Absorption in Oral Dosage Forms

Richard Stuart*

Department of Pharmacy, University of Federal, Brazil

INTRODUCTION

The rate and extent of drug dissolution and absorption depend on the properties of the Active Pharmaceutical Ingredient (API) and the properties of the dosage form. For this reason, the role of formulations at the point of drug delivery cannot be ignored. Since orally administered drugs must be in solution to be absorbed in the gastrointestinal tract and reach the systemic circulation, dosage form plays an important role in regulating the rate of absorption. Solid oral dosage forms are the preferred choice for most APIs because they are simple to manufacture, convenient to store, easy to transport, often more stable than their liquid counterparts, and have higher patient acceptance. Absorption of many drugs administered as solid oral dosage forms depends on many processes. Dissolution of the drug product into the gastrointestinal fluid, crossing the cell membrane into the systemic circulation, and ultimately drug absorption to its site of action. In this context, the biopharmaceutical properties of APIs have been shown to be of great importance as they influence drug bioavailability in biota.

DESCRIPTION

Many drugs, both on the market and in development, present a problem of low efficacy, which is mainly due to the poor characterization of biopharmaceuticals, leading to treatment failure. This is because when an API is administered orally as a solid dosage form, it is susceptible to incomplete dissolution and/or reduced ability to permeate the membrane that separates the site of absorption from the systemic circulation, and is metabolized when the drug is cleared from the systemic circulation may become unstable. Furosemide, a representative of this category of molecules, is classified as Class 4 in the Biopharmaceutics Classification System (BCS). This is due to its low water solubility and low permeability. FURO is preferentially absorbed in the stomach and upper intestine, where it is least soluble due to its mild acidity. Over the past decades, the search for new drug delivery systems aimed at enhancing the biopharmaceutical properties of orally administered drugs has grown rapidly. Recently, silica derivatives, carbon materials, and layered double hydroxides are used as hosts for poorly soluble and poorly permeable drugs. Growing interest in materials formed from inorganic host matrices and drug guests is an interesting alternative to organic matrices, which suffer from problems such as limited chemical and mechanical stability, susceptibility to microbial contamination, and low drug loading.

CONCLUSION

Among the methods available for tablet manufacturing, direct compression is the most advantageous due to its less equipment and space requirements, lower labor costs, shorter processing times, and lower energy consumption; tablet manufacturing DC is the fastest, easiest and protects the drug from heat and moisture. Although the TLC technique seems fairly simple, the selection of appropriate excipients and amounts in the formulation is a critical step in successful tablet formulation. The development of immediate release tablets using super disintegrates is poorly water soluble, which may delay dissolution due to poor wetting and/or slow liquid penetration into the tablet matrix when formulated as SOD of particular interest for drugs. Examples of superexplosives are: Crospovidone, sodium starch glycolate, crosslinked cellulose, crosslinked polymers, crosslinked starch; they are excipients that can be directly compressed without solvents.

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Corresponding author Richard Stuart, Department of Pharmacy, University of Federal, Brazil, E-mail: richardst01@gmail.com

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