

Formulation Considerations in Oral Medications

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ABOUT THE STUDY

The oral route of drug administration is preferred for its simplicity, non-invasiveness, and ease of use. Oral dosage forms are versatile, catering to a broad spectrum of patients, including pediatric, geriatric, and those with difficulty swallowing. The convenience of self-administration fosters patient compliance, a critical factor in the success of therapeutic regimens. Moreover, oral medications offer a systemic effect, as the drug is absorbed through the gastrointestinal tract and enters the bloodstream, reaching various target tissues.

Types of oral dosage forms

Tablets: These are solid dosage forms that comprise a compressed or molded mixture of the drug and excipients. They can be immediate-release, providing a rapid onset of action, or extended-release, delivering the drug gradually over an extended period. Tablets may also be film-coated or enteric-coated to improve taste, protect against stomach acidity, or enable targeted release in the intestines.

Capsules: These are encapsulate drugs within a gelatin or polymer shell. They offer an alternative to tablets, often facilitating the administration of taste-sensitive or poorly soluble drugs. Capsules can be immediate-release, extended-release, or designed for specific release profiles.

Syrups: These are liquid dosage forms containing a drug dissolved in a sugar-based solution. They are commonly used for pediatric or geriatric patients who may have difficulty swallowing solid forms. Syrups are also suitable for drugs requiring precise dosing or those with bitter tastes.

Suspensions: These are consist of finely divided drug particles dispersed in a liquid medium. They require shaking before administration to ensure uniform drug distribution. Suspensions are advantageous when formulating drugs with poor solubility or for patients who cannot swallow solid forms.

Emulsions: These are biphasic liquid dosage forms with dispersed droplets of one liquid within another. They are commonly used for lipid-soluble drugs and may offer improved bioavailability.

Chewable tablets: Designed for ease of administration, especially for pediatric patients, chewable tablets are flavored and easily crushed in the mouth. They combine the convenience of tablets with palatability.

Orally Disintegrating Tablets (ODTs): ODTs rapidly disintegrate or dissolve in the mouth without the need for water. They provide a convenient option for patients who have difficulty swallowing tablets or capsules.

Formulation considerations

Excipients: The formulation of oral dosage forms involves the use of excipients, which are inactive ingredients that enhance stability, improve drug solubility, aid in drug release, and contribute to the overall product characteristics. Common excipients include binders, fillers, disintegrants, lubricants, and flavoring agents.

Drug stability: Stability is a critical consideration in formulation to ensure that the drug remains potent and effective throughout its shelf life. Factors such as exposure to light, moisture, and temperature can impact the stability of oral dosage forms.

Bioavailability: It refers to the proportion of the drug that reaches the systemic circulation after administration. Formulation strategies aim to enhance bioavailability by improving drug solubility, dissolution rate, and absorption.

Release profiles: Depending on the therapeutic goals, oral dosage forms may be formulated for immediate release, sustained release, or modified release. Each release profile has specific applications, influencing the frequency and duration of drug administration.

Advancements in oral drug delivery

Nanotechnology: Nanoparticles and nanocarriers are increasingly utilized in oral drug delivery to improve drug solubility, bioavailability, and targeted delivery. Nano-sized carriers

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can protect drugs from degradation and enhance their absorption in the gastrointestinal tract.

Oral thin films: These films, also known as oral strips, are thin, flexible sheets containing a drug. They dissolve rapidly in the mouth, offering a convenient and discreet alternative to traditional oral dosage forms.

3D printing: Additive manufacturing techniques, such as 3D printing, have been explored for personalized medicine and the

on-demand production of oral dosage forms. This technology allows for precise control over drug dosages and release profiles.

Smart drug delivery: Incorporating smart materials and stimuli-responsive systems into oral dosage forms enables controlled drug release in response to specific physiological cues. This innovation enhances precision and therapeutic efficacy.