



Developing Drug Presentation to Improve Patient Adherence and Innovative Methods

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DESCRIPTION

Dosage forms, the vehicles through which medications are delivered to patients, represent a pivotal nexus between pharmaceutical science and patient care. From tablets and capsules to injections and inhalers, the design and formulation of dosage forms has a main role in drug delivery, efficacy, and patient adherence.

The essence of dosage forms

At its essence, a dosage form encompasses the physical presentation of a medication, including its composition, structure, and route of administration. The choice of dosage form is influenced by a myriad of factors, including the physicochemical properties of the drug substance, therapeutic objectives, patient preferences, and practical considerations such as stability and shelf-life. Whether in solid, liquid, semisolid, or aerosol form, each dosage form serves as a tailored vehicle for drug delivery, optimizing absorption, distribution, and bioavailability while minimizing adverse effects.

Solid dosage forms: Solid dosage forms, such as tablets and capsules, represent the cornerstone of pharmaceutical formulation due to their ease of administration, stability, and versatility. Tablets, comprising compressed or molded powders, offer precise dosing, uniformity, and ease of handling, making them suitable for both immediate and sustained-release formulations. Capsules, on the other hand, provide a convenient and taste-masked dosage form, particularly for patients who have difficulty swallowing tablets. The design of solid dosage forms involves intricate considerations of excipients, disintegration properties, and release kinetics, ensuring optimal drug delivery and therapeutic efficacy.

Liquid dosage forms: Liquid dosage forms, including solutions, suspensions, and emulsions, offer distinct advantages in terms of ease of administration, flexibility in dosing, and rapid onset of action. Solutions, characterized by homogeneity and clarity, are

ideal for drugs with high solubility and bioavailability, allowing for rapid absorption and predictable pharmacokinetics. Suspensions, comprising finely dispersed drug particles in a liquid medium, provide a means to deliver poorly soluble drugs in a palatable and easily administrable form. Emulsions, consisting of dispersed oil droplets in an aqueous phase, offer enhanced stability and bioavailability for lipophilic drugs, serving as effective carriers for both oral and topical administration.

Semisolid dosage forms: Semisolid dosage forms, such as creams, ointments, and gels find application in dermatology, wound care, and transdermal drug delivery. These formulations offer advantages in terms of localized drug delivery, prolonged contact time with the skin and ease of application. Creams, characterized by their water-in-oil or oil-in-water emulsion bases, provide moisturization and ease of spreadability, making them suitable for topical treatments of various skin conditions. Ointments, composed of hydrophobic bases such as petrolatum or lanolin, offer occlusive properties and prolonged drug release, making them ideal for wound healing and barrier protection. Gels, comprising a network of cross-linked polymers in a liquid medium, exhibit high viscosity and bioadhesive properties, enabling targeted drug delivery and sustained release across mucosal surfaces.

Specialized dosage forms

In addition to conventional dosage forms, specialized formulations have been developed to address specific patient needs and therapeutic challenges. Controlled-release formulations, such as transdermal patches and depot injections, offer sustained drug release over an extended period, reducing dosing frequency and improving patient adherence. Orally Disintegrating Tablets (ODTs) and film strips provide convenient alternatives for patients who have difficulty swallowing conventional dosage forms, offering rapid disintegration and absorption in the oral cavity. Inhalation aerosols and nebulized solutions deliver medications directly to the respiratory tract, offering the targeted

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Received: 08-Jan-2024, Manuscript No. JBB-24-25050; **Editor assigned:** 11-Jan-2024, PreQC No. JBB-24-25050 (PQ); **Reviewed:** 25-Jan-2024, QC No. JBB-24-25050; **Revised:** 01-Feb-2024, Manuscript No. JBB-24-25050 (R); **Published:** 08-Feb-2024, DOI: 10.35248/0975-0851.24.16.560

Citation: He J (2024) Developing Drug Presentation to Improve Patient Adherence and Innovative Methods. J Bioequiv Availab. 16:560.

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therapy for asthma, Chronic Obstructive Pulmonary Disease (COPD), and other respiratory conditions.

Challenges and innovations

Despite the diversity and sophistication of modern dosage forms, challenges persist in ensuring optimal drug delivery, patient adherence, and therapeutic outcomes. Variability in

gastrointestinal physiology, patient compliance, and drug metabolism can impact the performance of oral dosage forms, leading to fluctuations in drug absorption and therapeutic response. Moreover, issues such as taste aversion, pill burden and dosing frequency can compromise patient adherence, undermining the effectiveness of pharmacotherapy.