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Opinion Article

# Advancements in the Development and Evaluation of Fast Dissolving Tablets

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## DESCRIPTION

Fast Dissolving Tablets (FDTs) have emerged as a promising drug delivery system in recent years. These tablets, also known as orally disintegrating tablets or rapid-dissolve tablets, offer several advantages over conventional dosage forms, such as improved patient compliance, ease of administration, and rapid onset of action. This article explores the development and evaluation of fast dissolving tablets, highlighting the significant progress made in this field.

### Development of fast dissolving tablets

The development of fast dissolving tablets involves the careful selection of excipients and optimization of formulation parameters to achieve rapid disintegration and dissolution. Various techniques have been employed, including direct compression, freeze-drying, sublimation, spray drying, and tablet moulding. These techniques aim to enhance tablet porosity, reduce disintegration time, and promote rapid dissolution.

Excipients play a critical role in formulating FDTs. Super disintegrants, such as croscarmellose sodium, crospovidone, and sodium starch glycolate, are commonly used to promote tablet disintegration. Additionally, sugar-based excipients like mannitol and sorbitol contribute to the pleasant taste and mouthfeel of the tablet. Other excipients, such as fillers, binders, and lubricants, are also incorporated to ensure tablet integrity and facilitate manufacturing processes.

### Evaluation of fast dissolving tablets

The evaluation of fast dissolving tablets involves various parameters to assess their quality, performance, and patient acceptability. Key evaluation parameters include disintegration time, dissolution rate, content uniformity, hardness, friability, and taste masking efficiency. Disintegration time is a crucial parameter as it determines the tablet's ability to rapidly disintegrate in the oral cavity. Ideally, FDTs should disintegrate within a few seconds without the need for water. Dissolution rate, on the other hand, reflects the tablet's ability to release the drug rapidly, leading to faster onset of action. Both disintegration time and dissolution rate can be evaluated using standardized methods, such as the disintegration apparatus and dissolution apparatus, respectively.

Content uniformity ensures that the dosage form provides consistent drug content throughout its shelf life. This evaluation parameter is particularly important to guarantee accurate dosing and efficacy. Mechanical properties, such as hardness and friability, determine the tablet's physical strength and ability to withstand handling, packaging, and transportation. Moreover, taste masking efficiency is essential for FDTs, as some drugs possess unpleasant tastes. The inclusion of taste-masking agents or the selection of suitable flavors helps to enhance patient acceptability, especially in the case of pediatric and geriatric populations.

### Advancements in formulation

**Super disintegrants**: Superdisintegrants play a crucial role in the formulation of fast dissolving tablets by promoting rapid tablet disintegration and drug dissolution. Several novel superdisintegrants have been introduced, such as crospovidone, croscarmellose sodium, and sodium starch glycolate. These newer superdisintegrants possess improved swelling and disintegration properties, leading to faster drug release.

**Co-processed excipients**: To enhance tablet characteristics, co-processed excipients have been developed by combining different excipients with complementary functionalities. For example, co-processing of a superdisintegrant with a diluent or binder can improve tablet integrity and dissolution rate, while minimizing the total amount of excipients required.

**Nanotechnology**: Incorporation of nanosized drug particles or nanoparticles into fast dissolving tablets has shown promise in enhancing drug dissolution and bioavailability. Nanotechnology-based formulations can improve the solubility of poorly water-soluble drugs and provide more controlled drug release profiles.

### Advancements in manufacturing

**Direct compression technology**: Traditional methods of tablet manufacturing, such as wet granulation, may not be suitable for fast dissolving tablets due to the potential loss of tablet porosity and disintegration properties. The advancement in direct

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compression technology has enabled the efficient production of FDTs, eliminating the need for wet granulation steps and reducing production time and cost.

**Freeze-drying and spray-drying**: These techniques have been employed to manufacture fast dissolving tablets containing thermolabile or moisture-sensitive drugs. Freeze-drying preserves the integrity of the drug during the manufacturing process, while spray-drying enables the formation of solid dispersions with improved solubility and dissolution rates.

## CONCLUSION

The development and evaluation of fast dissolving tablets have witnessed significant advancements, leading to the emergence of an efficient and patient-friendly drug delivery system. The optimization of formulation techniques and the careful selection of excipients have played crucial roles in achieving rapid disintegration, enhanced dissolution, and improved patient compliance. Standardized evaluation parameters ensure the quality, performance, and acceptability of fast dissolving tablets. With ongoing research and development efforts, fast dissolving tablets hold great potential for future advancements in pharmaceutical formulations, benefiting patients worldwide.