Review Article

FAST DISSOLVING TABLETS: AN OVERVIEW

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ABSTRACT

Method to improve patient's compliance has always attracted scientists towards the development of fancy oral drug delivery systems. Among them, mouth dissolving drug delivery systems have acquired an important position in the market by overcoming previously encountered administration problems. Swallowing a pill is a major difficulty encountered in case of geriatric and pediatric patient which leads to poor patient compliance due to unpalatable taste of drug. To troubleshoot these problems a new dosage form known as fast-dissolving tablet (FDT), has been developed which rapidly disintegrate and dissolve in saliva. FDT are intended and designed to disintegrate and dissolve in saliva and then easily swallowed without need of water which is a major benefit over conventional dosage form. This review focused on the advantages, disadvantages and technologies used in the preparation of fast dissolving tablets.

Keywords: Fast dissolving tablets, dissolution, disintegration.

INTRODUCTION

Oral routes of drug administration have wide acceptance up to 50-60% of total dosage forms. Solid dosage forms are popular because of ease of administration, accurate dosage, self medication, pain avoidance and most importantly the patient compliance. The most popular solid dosage forms are being tablets and capsules; one important drawback of this dosage forms for some patients, is the difficulty to swallow. Drinking water plays an important role in the swallowing of oral dosage forms. Often times people experience inconvenience in swallowing conventional dosage forms such as tablet when water is not available, in the case of the motion sickness (kinetosis) and sudden episodes of coughing during the common cold, allergic condition and bronchitis. For these reason, tablets that can rapidly dissolve or disintegrate in the oral cavity have attracted a great deal of attention. Or dispersible tablets are not only indicated for people who have swallowing difficulties, but also are ideal for active people[1]. Fast dissolving tablets are also called as mouth-dissolving tablets, melt-in mouth tablets, Orodispersible tablets, rapimelts, porous tablets, quick dissolving etc. Fast dissolving tablets are those when put on tongue disintegrate instantaneously releasing the drug which dissolve or disperses in the saliva[2]. The faster the drug into solution, quicker the absorption and onset of clinical effect. Some drugs are absorbed from the mouth, pharynx and esophagus as the saliva passes down into the stomach. In such cases, bioavailability of drug is significantly greater than those observed from conventional tablets dosage form. Though conventional oral and parenteral routes are used widely to achieve systemic action of drugs, various mucosa are being explored as possible alternative routes for drug delivery .Several constraints like difficulty in swallowing experienced by many pediatrics and geriatrics[3], and in chewing by edentulous[4]; nausea and vomiting experienced with certain drugs when released in stomach[5]; degradation and metabolism of susceptible drugs in gastrointestinal tract[6] tissue necrosis and irritation from repeated administration of parenterals[7] high expenses due to sterile manufacturing[8] are avoided through oromucosal delivery of drugs. In certain diseases like epilepsy, rapid onset of drug action is necessary to suppress convulsion and terminate seizures. Thus early termination of seizures by initiating therapy as soon as possible, preferably at home, has been emphasized as a key to minimize morbidity of these seizures[8,9,10]. Since many decades tablet is the most popular dosage form among all the dosage forms due to its low cost, easier to self administer and easily formulated in pharmaceutical companies. However in case of dyspepsia of geriatric patients, the underdeveloped muscular and nervous system in young individuals and incase of uncooperative patient patients, many problem is occur but swallowing is common phenomenon which leads to poor patient compliance[11].To improvement these drawbacks fast dissolving tablets (FDT) or orally disintegrating tablets; (ODT) has emerged as alternative oral dosage forms. These are novel types of tablets that disintegrate/dissolve/ disperse in saliva within few seconds. According European Pharmacopoeia, the ODT should disperse/disintegrate in less than three minutes. Drug absorption through local oral–mucosal and through pre and post gastric parts of G.I.T[11,12]. A fast dissolving drug delivery system, in case tablets and films dissolve in mouth when come in contact with saliva. Fast dissolving delivery system contains sweeteners for taste masking. Their growing importance was underlined recently when European pharmacopoeia adopted the term "Orodispersible tablet" as a tablet that to be placed in the mouth where it disperses rapidly before swallowing. According to European pharmacopoeia, the ODT should disperse/disintegrate in less than three minutes. The

basic approach in development of FDT is the use of superdisintegrants like cross linked carboxymethyl cellulose (croscarmellose), sodium starch glycolate (primogel, explotab), polyvinylpyrollidone (polyplasdone) etc, which provide instantaneous disintegration of tablet after putting on tongue, their by release the drug in saliva. The bioavailability of some drugs may be increased due to absorption of drug in oral cavity and also due to pregastric absorption of saliva containing dispersed drugs that pass down into the stomach. More ever, the amount of drug that is subjected to first pass metabolism is reduced as compared to standard tablet. The technologies used for manufacturing fast-dissolving tablets are freeze-drying, spray-drying, tablet molding, sublimation, sugar-based excipients, tablet compression, and disintegration addition. As a result of increased life expectancy, the elderly constitute a large portion of the worldwide population today. These people eventually will experience deterioration of their physiological and physical abilities[13].

Advantages[14]

1. FDT can be administer to the patients who can not swallow tablets/cap., such as the elderly, stroke victims, bedridden patients, & patients who refuse to swallow such as pediatric, geriatric & psychiatric patients.
2. Rapid drug therapy is possible.
3. Certain studies concluded increased bioavailability/proved rapid absorption of drugs through pregastric absorption of drugs from mouth, pharynx & oesophagus as saliva passes down.
4. FDT are convenient for administration and passes good patient compliant for disabled, bedridden patients and for travelers and busy people, who do not always have access to water.
5. Good mouth feel property of FDT helps to change the perception of medication as bitter pill particularly in pediatric patients.
6. The risk of chocking or suffocation during oral administration of conventional formulations due to physical obstruction is avoided, thus providing improved safety.
7. FDT opened new business opportunity like product differentiation, product promotion, patent extension and life cycle management.

Disadvantages

1. Fast dissolving tablet is hygroscopic in nature so must be keep in dry place.
2. Some time it possesses mouth feeling.
3. Show the fragile, effervescence granules property.
4. FDT requires special packaging for properly stabilization & safety of stable product.

Criteria for fast dissolving drug delivery system[13]

The tablets should follow the following criteria's:

1. Not require water to swallow, but it should dissolve or disintegrate in the mouth in matter of seconds.
2. Should be compatible with taste masking.
3. Should be portable without fragility concern.
4. Should have a pleasant mouth feel.
5. Should leave minimum or no residue in the mouth after oral administration.
6. Should exhibit low sensitive to environmental condition as temperature and humidity.
7. Should allow the manufacture of the tablet using conventional, processing and packaging equipments at low cost.

Salient feature of fast dissolving drug delivery system[15,16]

1. Ease of Administration to the patient who can not swallow, such as the elderly, stroke victims, bedridden patients, patient affected by renal failure and patient who refuse to swallow such as pediatric, geriatric & psychiatric patients.
2. No need of water to swallow the dosage form, which is highly convenient feature for patients who are traveling and do not have immediate access to water.
3. Rapid dissolution and absorption of the drug, which will produce quick onset of action.
4. Some drugs are absorbed from the mouth, pharynx and esophagus as the saliva passes down into the stomach. In such cases bioavailability of drug is increased.
5. Pregastric absorption can result in improved bioavailability and as a result of reduced dosage; improve clinical performance through a reduction of unwanted effects.
6. Good mouth feel property helps to change the perception of medication as bitter pill particularly in pediatric patient.
7. The risk of chocking or suffocation during oral administration of conventional formulation due to physical obstruction is avoided, thus providing improved safety.
8. New business opportunity like product differentiation, product promotion, patent extensions and life cycle management.
9. Beneficial in cases such as motion sickness, sudden episodes of allergic attack or coughing, where an ultra rapid onset of action required.
10. An increased bioavailability, particularly in cases of insoluble and hydrophobic drugs, due to rapid disintegration and dissolution of these tablets.

11. Stability for longer duration of time, since the drug remains in solid dosage form till it is consumed. So, it combines advantage of solid dosage form in terms of stability and liquid dosage form in terms of bioavailability.

Limitations of mouth dissolving tablets[13]

- The tablets usually have insufficient mechanical strength. Hence, careful handling is required.
- The tablets may leave unpleasant taste and/or grittiness in mouth if not formulated properly.

CHARACTERISTICS OF FDDS

Ease of administration

Fast Dissolving Delivery Systems are easy to administer and handle hence, leads to better patient compliance. Usually, elderly people experience difficulty in swallowing the conventional dosage forms (tablets, capsules, solutions and suspensions) because of tremors of extremities and dysphasia. Fast Dissolving Delivery Systems may offer a solution for these problems[17].

Taste of the medicament

Mouth dissolving delivery systems usually contain the medicament in taste masked form. Taste-masking is of critical importance in the formulation of an acceptable FDDT. Traditional tablet formulations generally do not address the issue of taste masking, because it is assumed that the dosage form will not dissolve until passing the oral cavity. Many oral suspensions, syrups, and chewable tablets simply contain flavors, sugars and other sweeteners to overwhelm or complement the bitter taste of the drug[19]. Current methods of taste masking in fast dissolving/disintegrating tablets include sweeteners and flavors; however, these are not a sufficient means for taste-masking many bitter drugs.

Hygroscopicity

Several fast dissolving dosage forms are hygroscopic and cannot maintain physical integrity under normal condition from humidity which calls for specialized product packaging[18].

Friability

In order to allow fast dissolving tablets to dissolve in the mouth, they are made of either very porous and soft moulded matrices or compressed into tablets with very low compression force, which makes the tablets friable and/or brittle which are difficult to handle, often requiring specialized peel-off blister packaging[17].

Mouth feel

Mouth feel is critical, and patients should receive a product that feels pleasant. Any large particles from the disintegrating tablet that are insoluble or slowly soluble in saliva would lead to an unpleasant gritty feeling. This can be overcome by keeping the majority of the particles below the detectable size limit. In some cases, certain flavors can imbibe an improved mouth feel perception, resulting in a product that is perceived as being less gritty, even if the only change is the flavor. Effervescence can be added to aid disintegration and improve mouth feel by reducing the "dryness" of a product[20].

Ideal drug candidates of fast dissolving tablets[21,22]

1. Dose should be lower than 20 mg for FDT.
2. Drug should be partially nonionized at pH in oral cavity.
3. Drug should be diffuse and partition into the epithelium of the upper GIT (log P > 1, or preferably >2)
4. Drug should have to permeate through oral mucosal tissue.

Ideal drugs which are used in fast dissolving drug delivery system[23-25]

Example of some drug candidates best for FDT:

Analgesic and Anti-Inflammatory Agents: Ibuprofen, Proxicam, Mefenamic Acid

Anti-bacterial Agent: Erythromycin, Tetracycline, Doxycycline.

Anti-fungal Agents: Griseofulvin, Miconazole

Anti-Malarial: Chlorquine, Amodiaquine

Anti-Gout Agent: Allopurinol, Probenecid

Anti-Hypertensive: Amlodipine, Nefidipine

Anti-Coagulants: Glipizide,Tolbutamide

Anti-Protozoal Agents: Benznidazole, Tinidazole

Anti-Thyroid agent: Carbimazole

Cardiac Inotropic Agent: Digitoxin, Digoxis

Gastro-Intestinal Agents: Omeprazole, Ranitidine, Famotidine

Nutritional Agents: Vitamin A, Vitamin B, Vitamin D etc

Oral Vaccine: Influenza, Hepatitis, Polio, Tuberculosis etc

Marketed Preparation of Fast Dissolving Tablets in India

Name of the Product	Active Ingredients
Nimulid-MD	Nimuslide
Feldene Melt	Piroxicam (10-20 mg)
Pepcid RPD	Fomatidine (20-40mg)
Zyrof Meltab	Rofecoxib
Pepcidin Rapitab	Quick releasing antiulcer preparation of Pepcid
Zofran ODT	Ondansetron (4 or 8 mg)
Claritin Reditab	Micronized loratadine

Techniques for Preparing Fast Dissolving Tablets

Many techniques have been reported for the formulation of Fast dissolving tablets or Orodispersible tablets.

- Freeze drying / lyophilization

- Tablet Molding
- Spray drying
- Sublimation
- Direct compression
- Mass extrusion
- Taste masking
- Cotton candy

Freeze-Drying or Lyophilization[13]

Freeze drying is the process in which water is sublimed from the product after it is frozen. This technique creates an amorphous porous structure that can dissolve rapidly. A typical procedure involved in the manufacturing of ODT using this technique is mentioned here. The active drug is dissolved or dispersed in an aqueous solution of a carrier/polymer. The mixture is done by weight and poured in the walls of the preformed blister packs. The trays holding the blister packs are passed through liquid nitrogen freezing tunnel to freeze the drug solution or dispersion. Then the frozen blister packs are placed in refrigerated cabinets to continue the freeze-drying. After freeze-drying the aluminum foil backing is applied on a blister-sealing machine. Finally the blisters are packaged and shipped. The freeze-drying technique has demonstrated improved absorption and increase in bioavailability. The major disadvantages of lyophilization technique are that it is expensive and time consuming; fragility makes conventional packaging unsuitable for these products and poor stability under stressed conditions.

Tablet Molding[13]

Molding process is of two type's i.e. solvent method and heat method. Solvent method involves moistening the powder blend with a hydro alcoholic solvent followed by compression at low pressures in molded plates to form a wetted mass (compression molding). The solvent is then removed by air-drying. The tablets manufactured in this manner are less compact than compressed tablets and posses a porous structure that hastens dissolution. The heat molding process involves preparation of a suspension that contains a drug, agar and sugar (e.g. mannitol or lactose) and pouring the suspension in the blister packaging wells, solidifying the agar at the room temperature to form a jelly and drying at 30oC under vacuum. The mechanical strength of molded tablets is a matter of great concern. Binding agents, which increase the mechanical strength of the tablets, need to be incorporated. Taste masking is an added problem to this technology.

The taste masked drug particles were prepared by spray congealing a molten mixture of hydrogenated cottonseed oil, sodium carbonate, lecithin, polyethylene glycol and an active ingredient into a lactose based tablet triturate form. Compared to the lyophillization technique, tablets produced by the molding technique are easier to scale up for industrial manufacture.

Spray Drying[13]

In this technique, gelatin can be used as a supporting agent and as a matrix, mannitol as a bulking agent and sodium starch glycolate or croscarmellose or crospovidone are used as superdisintegrants. Tablets manufactured from the spray-dried powder have been reported to disintegrate in less than 20 seconds in aqueous medium. The formulation contained bulking agent like mannitol and lactose, a superdisintegrant like sodium starch glycolate & croscarmellose sodium and acidic ingredient (citric acid) and/or alkaline ingredients (e.g. sodium bicarbonate). This spray-dried powder, which compressed into tablets showed rapid disintegration and enhanced dissolution.

Sublimation[13]

To generate a porous matrix, volatile ingredients are incorporated in the formulation that is later subjected to a process of sublimation. Highly volatile ingredients like ammonium bicarbonate, ammonium carbonate, benzoic acid, camphor, naphthalene, urea, urethane and phthalic anhydride may be compressed along with other excipients into a tablet. This volatile material is then removed by sublimation leaving behind a highly porous matrix. Tablets manufactured by this technique have reported to usually disintegrate in 10-20 sec. Even solvents like cyclohexane; benzene can be used as pore forming agents.

Direct Compression[13]

Direct compression represents the simplest and most cost effective tablet manufacturing technique. This technique can now be applied to preparation of ODT because of the availability of improved excipients especially superdisintegrants and sugar based excipients.

(a) Superdisintegrants

In many orally disintegrating tablet technologies based on direct compression, the addition of superdisintegrants principally affects the rate of disintegration and hence the dissolution. The presence of other formulation ingredients such as water soluble excipients and effervescent agents further hastens the process of disintegration.

(b) Sugar Based Excipients

This is another approach to manufacture ODT by direct compression. The use of sugar based excipients especially bulking agents like dextrose, fructose, isomalt, lactilol, maltilol, maltose, mannitol, sorbitol, starch hydrolysate, polydextrose and xylitol, which display high aqueous solubility and sweetness, and hence impart taste masking property and a pleasing mouthfeel. Mizumito *et al*., have classified sugar-based excipients into two types on the basis of molding and dissolution rate. For Instances: Type 1 saccharides (lactose and mannitol) exhibit low

mouldability but high dissolution rate and Type 2 saccharides (maltose and maltilol) exhibit high mouldability and low dissolution rate.

Mass-Extrusion[13]

This technology involves softening the active blend using the solvent mixture of water-soluble polyethylene glycol and methanol and subsequent expulsion of softened mass through the extruder or syringe to get a cylinder of the product into even segments using heated blade to form tablet. The dried cylinder can also be used to coat granules for bitter drugs and thereby achieve taste masking.

Taste masking[26]

Taste masking is an essential requirement for fast dissolving tablets for commercial success. Taste masking of the active ingredients can be achieved by various techniques. Drugs with unacceptable bitter taste can be microencapsulated into pH sensitive acrylic polymers. Cefuroxime axetil is microencapsulated in various types of acrylic polymers (e.g., Eudragit E, Eudragit L-55 and Eudragit RL) by solvent evaporation and solvent extraction techniques. These polymer microspheres showed efficient taste masking and complete dissolution in a short period. Fine granules of drug and disintegrant (e.g. low substituted hydroxypropyl cellulose) when coated with a water insoluble polymer (e.g. ethylcellulose) masked the bitter taste of sparfloxacin. The addition of low substituted hydroxypropyl cellulose as disintegrant to the drug in cores, resulted in increased dissolution rate and bioavailability of sparfloxacin compared to its conventional tablets. A novel technique for taste masking of macrolides (e.g. erythromycin and clarithromycin) is reported by Yajima *et al.,* Monoglycerides having a low melting point which can form good elaborate film, and easily soluble in intestine, and polymers which are insoluble in the mouth (pH 5-8), but are freely soluble in stomach (pH 1-4), are selected for taste masking of drugs with unpleasant taste. The polymer is dissolved or dispersed in monoglyceride, and the drug is granulated with above mixture and the resultant granules are cooled.

Cotton candy[20]

This process is so named as it utilizes a unique spinning mechanism to produce floss-like crystalline structure, which mimic cotton candy. Cotton candy process involves formation of matrix of polysaccharides or saccharides by simultaneous action of flash melting and spinning. The matrix formed is partially recrystallized to have improved flow properties and compressibility. This candy floss matrix is then milled and blended with active ingredients and excipients and subsequently compressed to ODT. This process can accommodate larger drug doses and offers improved mechanical strength. However, high-process temperature limits the use of this process.

PATENTED TECHNOLOGIES FOR FDT

1. Zydis Technology[13]

Zydis formulation is a unique freeze dried tablet in which drug is physically entrapped or dissolved within the matrix of fast dissolving carrier material. When zydis units are put into the mouth, the freeze-dried structure disintegrates instantaneously and does not require water to aid swallowing. The zydis matrix is composed of many material designed to achieve a number of objectives. To impart strength and resilience during handling, polymers such as gelatin, dextran or alginates are incorporated. These form a glossy amorphous structure, which imparts strength. To obtain crystallinity, elegance and hardness, saccharides such as mannitol or sorbitol are incorporated. Water is used in the manufacturing process to ensure production of porous units to achieve rapid disintegration while various gums are used to prevent sedimentation of dispersed drug particles in the manufacturing process. Collapse protectants such as glycine prevent the shrinkage of zydis units during freeze-drying process or long-term storage. Zydis products are packed in blister packs to protect the formulation from moisture in the environment.

2. Durasolv Technology[13]

Durasolv is the patented technology of CIMA labs. The tablets made by this technology consist of drug, filler and a lubricant. Tablets are prepared by using conventional tabletting equipment and have good rigidity. These can be packaged into conventional packaging system like blisters. Durasolv is an appropriate technology for product requiring low amounts of active ingredients.

3. Orasolv Technology[13]

CIMA labs have developed Orasolv Technology. In this system active medicament is taste masked. It also contains effervescent disintegrating agent. Tablets are made by direct compression technique at low compression force in order to minimize oral dissolution time. Conventional blenders and tablet machine is used to produce the tablets. The tablets produced are soft and friable.

4. Flash Dose Technology[13]

Flash dose technology has been patented by fuisz. Nurofen meltlet, a new form of ibuprofen as melt in mouth tablets prepared using flash dose technology is the first commercial product launched by biovail corporation. Flash dose tablets consist of self-binding shear form matrix termed as “floss”. Shear form matrices are prepared by flash heat processing.

5. Wow tab Technology[13]

Wow tab technology is patented by Yamanouchi Pharmaceutical Co. WOW means “Without Water”. In this process, combination of low mould ability saccharides and high mouldability saccharides is used to obtain a rapidly melting strong tablet. The active ingredient is

mixed with a low mouldability saccharide (eg. lactose, glucose, and mannitol) and granulated with a high mouldability saccharide (eg. Maltose, oligosaccharides) and compressed into table.

6. Flash tab Technology[13]

Prographarm laboratories have patented the Flash tab technology. Tablet prepared by this system consists of an active ingredient in the form of micro crystals. Drug micro granules may be prepared by using the conventional techniques like coacervation, micro encapsulation and extrusion spheronisation. All the processing utilized conventional tableting technology.

7. OraQuick [26]

The OraQuick fast-dissolving/disintegrating tablet formulation utilizes a patented taste masking technology. KV Pharmaceutical claims its microsphere technology, known as MicroMask, has superior mouthfeel over taste-masking alternatives. The taste masking process does not utilize solvents of any kind, and therefore leads to faster and more efficient production. Also, lower heat of production than alternative fast-dissolving/disintegrating technologies makes OraQuick appropriate for heat-sensitive drugs. KV Pharmaceutical also claims that the matrix that surrounds and protects the drug powder in microencapsulated particles is more pliable, meaning tablets can be compressed to achieve significant mechanical strength without disrupting taste masking. OraQuick claims quick dissolution in a matter of seconds, with good taste-masking. There are no products using the OraQuick technology currently on the market, but KV Pharmaceutical has products in development such as analgesics, scheduled drugs, cough and cold, psychotropics, and anti-infectives.

8. Quick –Dis Technolog[13]

Lavipharm Laboratories Inc. (Lavipharm) has invented an ideal intraoralfast-dissolving drug delivery system, which satisfies the unmet needs of the market. The novel intraoral drug delivery system, trademarked Quick- Dis™, is Lavipharm's proprietary patented technology and is a thin, flexible, and quick dissolving film. The film is placed on the top or the floor of the tongue. It is retained at the site of application and rapidly releases the active agent for local and/or systemic absorption. The Quick-Dis™ drug delivery system can be provided in various packaging configurations, ranging from unitdose pouches to multiple-dose blister packages. The typical disintegration time, which is defined as the time at which the film begins to break when brought into contact with water, is only 5 to 10 seconds for the Quick-Dis™ film with a thickness of 2 mm. The dissolving time, which is defined as the time at which not less than 80% of the tested film is dissolved in aqueous media, is around 30 seconds for Quick Dis™ film with a thickness of 2 mm. The typical release profile of an active ingredient exhibited by a Quick-Dis™ drug delivery system is 50% released within 30 seconds and 95% within 1 minute.

9. Sheaform Technology[20]

This technology make Sheaform matrix consisting of floss preparation. Floss is produced by subjecting to a feedshock containing a sugar to flash heat processing.

10. CeformTechnology[20]

In this technology microspheres containing active ingredient are prepared. Basic requirement of this technology is placing dry powder containing either pure drug or special blend of drug and excipients. The microspheres then mixed and compressed into previously selected oral dosage form.

11. Lyoc (Laboratories L. Lafon, Maisons Alfort, France)[26]

Lyoc utilizes a freeze drying process but differ from Zydis in that the product is frozen on the freeze dryer shelves. To prevent inhomogeneity by sedimentation during this process, these formulations require a large proportion of undissolved inert filler (mannitol), to increase the viscosity of the in-process suspension. The high proportion of filler reduces the potential porosity of the dried dosage form and results in denser tablets with disintegration rates that are comparable with the loosely compressed fast melt formulations.

12. Pharmaburst technology[26]

Pharmaburst™ is a "Quick Dissolve" delivery system patented bySPI Pharma. Pharmaburst is a co-processed excipient system with specific excipients, which allows rapid disintegration and low adhesion to punch faces mouldablilty saccharides are used to obtain rapid melting strong tablet. The active ingredient mixes with low mouldablilty saccharides.

13. Frosta technology[26]

Akina patents this technology. It utilizes the concept of formulating plastic granules and compressing them at low pressure to produce strong tablets with high porosity. Plastic granules composed of porous and plastic material, water penetration enhancer, and binder. The process involves mixing the porous plastic material with water penetration enhancer followed by granulating with binder. The tablets obtained have excellent hardness and rapid disintegration time ranging from 15 to 30 sec depending on size of tablet.

14. Nano technology[26]

For fast dissolving tablets, Élan's proprietary NanoCrystal technology can enable formulation and improve compound activity and final product characteristics. Decreasing particle size increases the surface area, which leads to an increase in dissolution rate. This can be accomplished predictably and efficiently using NanoCrystal technology.

NanoCrystal™ Fast dissolving technology provides for:

1. Pharmacokinetic benefits of orally administered nanoparticles (<2 microns) in the form of a rapidly disintegrating tablet matrix ·Product differentiation

based upon a combination of proprietary and patent-protected technology elements

2. Cost-effective manufacturing processes that utilize conventional, scalable unit operations
3. Exceptional durability, enabling use of conventional packaging equipment and formats (i.e., bottles and/or blisters)
4. Wide range of doses (up to 200mg of API per unit)
5. Use of conventional, compendial inactive components
6. Employment of non-moisture sensitive inactives.

15. Advatab[26]

AdvaTab tablets disintegrate rapidly in the mouth, typically in less than 30 seconds, to allow for convenient oral drug administration without water. These tablets are especially suited to those patients that experience difficulty in swallowing capsules and tablets. AdvaTab is distinct from other ODT technologies as it can be combined with Eurand's complimentary particle technologies like its world leading Microcaps® taste-masking technology and its Diffucaps®, controlled release technology. The pairing of AdvaTab with Microcaps creates products that offer the dual advantage of a patient preferred dosage form, together with a superior taste and smooth mouth feel. This is a critical advantage as the unpleasant taste of drugs is a significant restriction in the application of other ODT technologies.

CONCLUSION

The FDTs have potential advantages over conventional oral dosage forms with their improved patient compliance, convenience, bioavailability and rapid onset of action which drawn the attention of many manufactures over a decade. There is a clear opportunity for new enhanced oral products arising within this market segment. Approximately one-third of the population, primarily the geriatric and pediatric populations, has swallowing difficulties, resulting in poor compliance with oral tablet drug therapy which leads to reduced overall therapy effectiveness. A new tablet dosage format, the fast dissolving tablet has been developed which offers the combined advantages of ease of dosing and convenience of dosing in the absence of water or fluid. These tablets are designed to dissolve or disintegrate rapidly in the saliva generally within <60 seconds (range of 5-50seconds). Due to the constraints of the current FDDT technologies as highlighted above, there is an unmet need for improved manufacturing processes for fast dissolving tablets that are mechanically strong, allowing ease of handling and packaging and with production costs similar to that of conventional tablets. The research is still going on. More products need to be commercialized to use this technology properly. Thus FDT may be developed for most of the available drugs in near future.

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