Top form

Dr Thomas Hein, senior vice president, commercial and regulatory affairs at Hermes Pharma examines the benefits of multiple oral solid dosage forms and their impact on certain APIs

Introduction

In the excitement of bringing a new medicine to market, it can be easy to overlook the importance of selecting the right dosage form for your product. When it comes to oral drug delivery in particular, many pharmaceutical companies employ a tablet formulation almost automatically without ever stopping to consider what other options exist. While there are obvious reasons why tablets have become the de facto standard, there are other factors that suggest alternative dosage forms could be more beneficial to both pharma and patients. Over the years, I have worked with healthcare companies around the globe to support them in developing pharmaceuticals and food supplements that truly meet the needs and preferences of their customers, boosting market share and patient compliance in the process. This article discusses a range of alternative oral dosage forms and considers why they might offer a better outcome for your API.

Tablets: the automatic choice

Tablets remain the dosage form of choice for many pharmaceutical companies. They are relatively easy to manufacture, package and transport, offer good physical and chemical stability, and facilitate simple and accurate dosing. Various coating methods allegedly make them easier to swallow, allow API release profiles to be adjusted, and the shape and color of tablets to be modified for aesthetic purposes. What's more, their relatively low production costs make them an economical option for manufacturers, healthcare institutions and patients.

At first glance, tablets appear to be an ideal way for medicines to be administered. Yet speak to patients and consumers, and problems emerge.

Difficult to swallow

In a recent consumer study conducted by HERMES PHARMA and Spiegel Institut Mannheim (1), out of approximately 2000 people surveyed in the US and Germany, over half reported difficulties swallowing tablets and capsules. Other problems identified by those questioned included tablets having an unpleasant taste or odor, tablets being too large, and the feeling of tablets getting stuck in the throat.

These negative factors have a serious impact on patient compliance. Indeed, the survey found that in order to overcome these issues, 32% of those questioned reported breaking up tablets before swallowing them, 17% crushed and dissolved them in water, and 9% chewed them. Most worryingly, 8% of respondents resorted to not taking their medication altogether.

With modern patients increasingly accustomed to having choice and convenience in their lives, and willing to do their own research to determine what treatment options are available, they are not afraid to ask their doctor to prescribe a particular product or to use this information when purchasing over-the-counter medication. Put simply, today's patients are less likely to tolerate a product that does not adequately meet their needs.

Alternative dosage forms

So what do patients and consumers expect from their medicine? In essence, they want medicines that taste pleasant and are easy to ingest, even if they contain large amounts of API. They increasingly expect that medications should fit into their everyday lives. This might mean that a dosage form can be used on the move without water, or perhaps that it can be consumed as an enjoyable hot or cold drink. Lightweight, portable and easy-to-open packaging is also a big advantage.

Fortunately, there are user-friendly alternatives that offer a better patient experience and provide more choice. Specifically, these dosage forms are easy to swallow and are usually provided as individual doses that require no measurement and are designed for convenience. They can be formulated in a range of flavors, and are optimized to provide an enjoyable experience. By being more user-friendly and by offering patients more choice, these dosage forms help to achieve higher levels of patient compliance and therefore reduce overall healthcare costs.

There are a wide range of user-friendly dosage forms to choose from, including:

- **Effervescent tablets:** These dissolve readily in water, to be consumed as pleasant tasting drinks that also offer rehydration benefits and are easy to swallow. As the API is fully dissolved before being consumed, they provide rapid release of API and excellent bioavailability while also minimising gastric irritation. They can contain a large amount of API or even a combination of different APIs. Effervescents are also ideal for patients with low gastric fluid production, like elderly people taking proton pump inhibitor medications.
- **Orally disintegrating granules (ODGs):** Very small granules containing one or more APIs, ODGs are packaged in so-called "stick packs" and are poured directly into the mouth, where they dissolve without the need for any additional fluid. In addition to being a very convenient dosage form with excellent bioavailability, ODGs offer additional benefits to dialysis patients, for example, who need to reduce their daily intake of liquids.
- **Chewable tablets:** Chewable tablets are a user-friendly, convenient alternative to conventional tablets. In order to survive, human beings learn to chew nutriment from an early age making chewing a natural process for us. Hence most people find chewable tablets are very easy to take. As they do not need to be taken with liquids, they can be easily incorporated into daily routines. From a formulation perspective, they also offer a way to convert poorly soluble APIs into a user-friendly form.
- **Hot and cold instant drinks:** Individual sachets contain a single dose of powder or granules that dissolves in water, making it easy to dose and consume. Instant drinks may be effervescent or non-effervescent, and are a useful way to boost hydration. They also provide excellent bioavailability, and depending on the API, rapid release. Such characteristics make instant drinks particularly useful for cough and cold remedies.
- **Lozenges:** Lozenges are solid preparations that dissolve slowly in the mouth. They contain one or more APIs, usually in a flavored, sweetened base, and can be made with a slight 'fizzy' effect that stimulates saliva and makes the experience more enjoyable. In the form of a lozenge, APIs can provide both a local and systemic effect. This makes them particularly well suited to alleviating the symptoms of a sore throat.

Benefits for healthcare

The problem of patient noncompliance has a significant cost, both to the patient and the wider healthcare system. Nonadherence is associated with poor therapeutic outcomes, progression of disease, and an estimated burden of billions per year in avoidable direct healthcare costs (2). Between $100 and $300 billion of avoidable healthcare costs have been attributed to nonadherence in the US annually, representing 3% to 10% of total US healthcare expenditure. Even solving a fraction of these issues will save global healthcare systems millions of dollars each year. Compared with tablets, user-friendly dosage forms have been shown to overcome many of the obstacles to patient compliance.

Benefits for pharma, too

While improved user experience and convenience are important factors for today's modern patient, formulating APIs in user-friendly dosage forms can benefit the pharmaceutical industry too. Alternative dosage forms present an opportunity for pharmaceutical companies to expand product lines, allowing them to offer the same API in a variety of forms and flavors to better meet patient preferences. In addition to building market share, this can help boost brand loyalty and better differentiate products in the marketplace. Furthermore, new dosage forms can help overcome IP issues by allowing companies to reformulate medicines in ways that are more difficult for competitors to copy, or by providing grounds for patent extensions.

Overcoming challenges

Of course, there are good reasons why many pharmaceutical companies automatically turn to tablets as a dosage form. They are cost-efficient and are relatively easy to produce, whereas the development and production of user-friendly dosage forms requires specialized equipment and also introduces new processes. However, with the right expertise and technology, these additional challenges can be met.

As user-friendly dosage forms tend to spend more time in the mouth than conventional tablets, they are tasted more thoroughly. Consequently, taste and mouthfeel become very important factors in their success. Many APIs have an extremely bitter taste, so effective flavoring and taste-masking are vital. There are a number of technologies that can be used to achieve this. For example, hot melt coating can be applied for the production of ODGs in order to coat the API before blending the API intermediates with sweeteners and flavors into a final formulation. Likewise, in the manufacture of effervescent products, HERMES PHARMA uses TOPO technology to ensure that the final products are resistant to humidity and have a long shelf-life. Along with other formulation development steps, this offers a number of advantages for the final product.

Conclusions

Tablets are not the only solid oral dosage form available and it is important to consider the full range of options before selecting a dosage form for your API. Research shows that a large number of people experience difficulties taking tablets and that this can lead to limited- or non-compliance. User-friendly dosage forms provide pharmaceutical companies with an opportunity to develop better, more customer-orientated, more marketable products – and reap the financial benefits of doing so.

References:

[1] www.swallowingtablets.com

[2] http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3934668/