

A future free from needles

Needle-based injections have formed a huge part of the world's medical history but that's set to change, according to **GlobalData**, as demand for pain free drug delivery rises. The market for needle-free injection systems grew by more than 95% between 2001 and 2008, and is expected to rise by half again by 2015.

Pills and potions have been the most widely accepted form of drug delivery for a large part of modern day medicine. However, this trend is set to change, shifting away from the traditional methods of drug delivery towards specialised delivery devices that provide safer and more effective methods of medication. Driven by a demand for faster acting drugs and pain free delivery, the drug delivery market,

valued at \$755 million in 2008, is now heading towards the era of needle-free injection systems.

Needle-free injection systems use a liquid drug delivery technology that is designed to work with existing drug formulations. This helps to cut down development costs and speeds up the development cycles of such products. These systems have been successful in addressing a range of challenges

Figure 1. Needle-free injection systems, revenue (\$m), global, 2001-2008

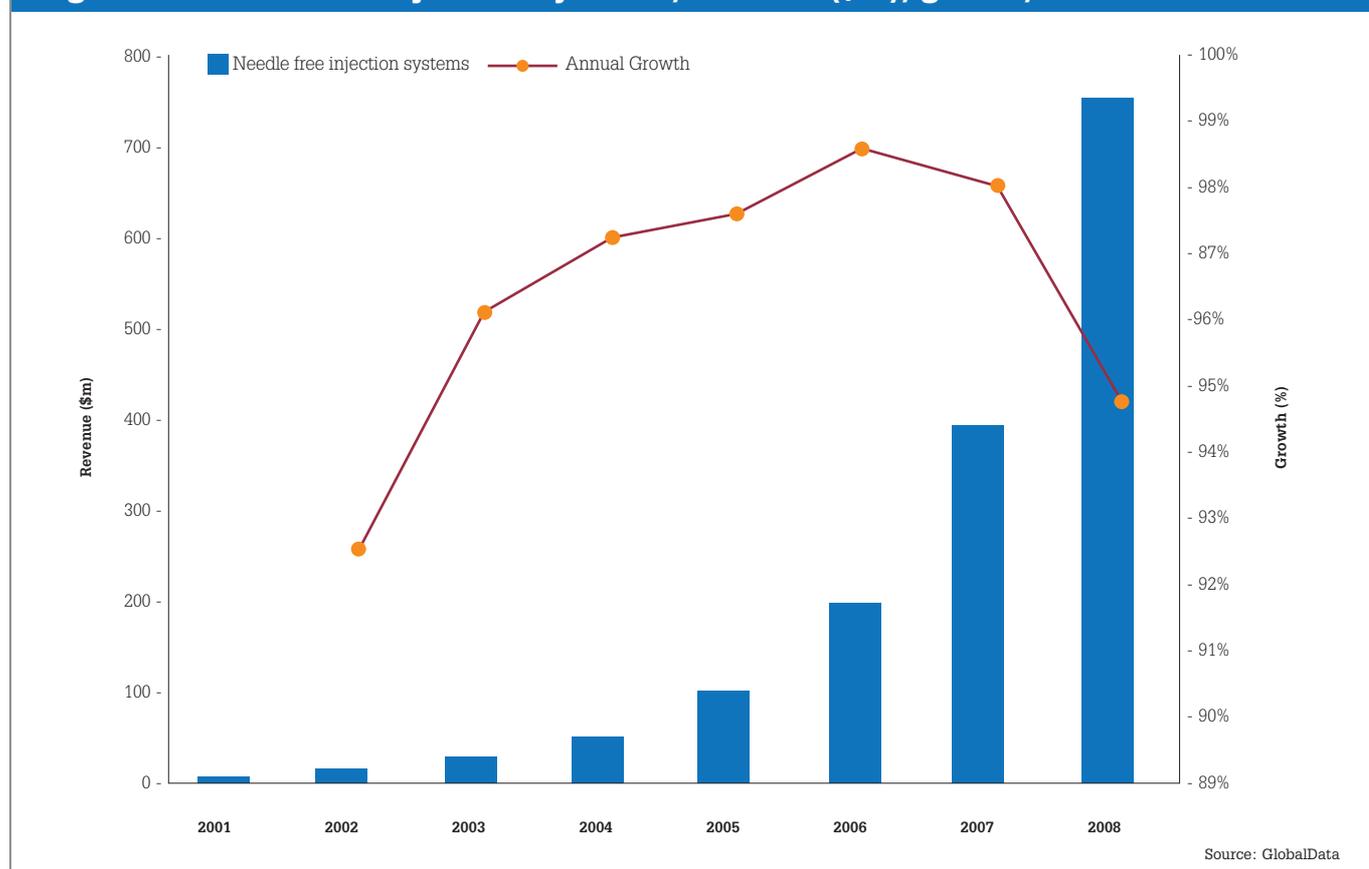
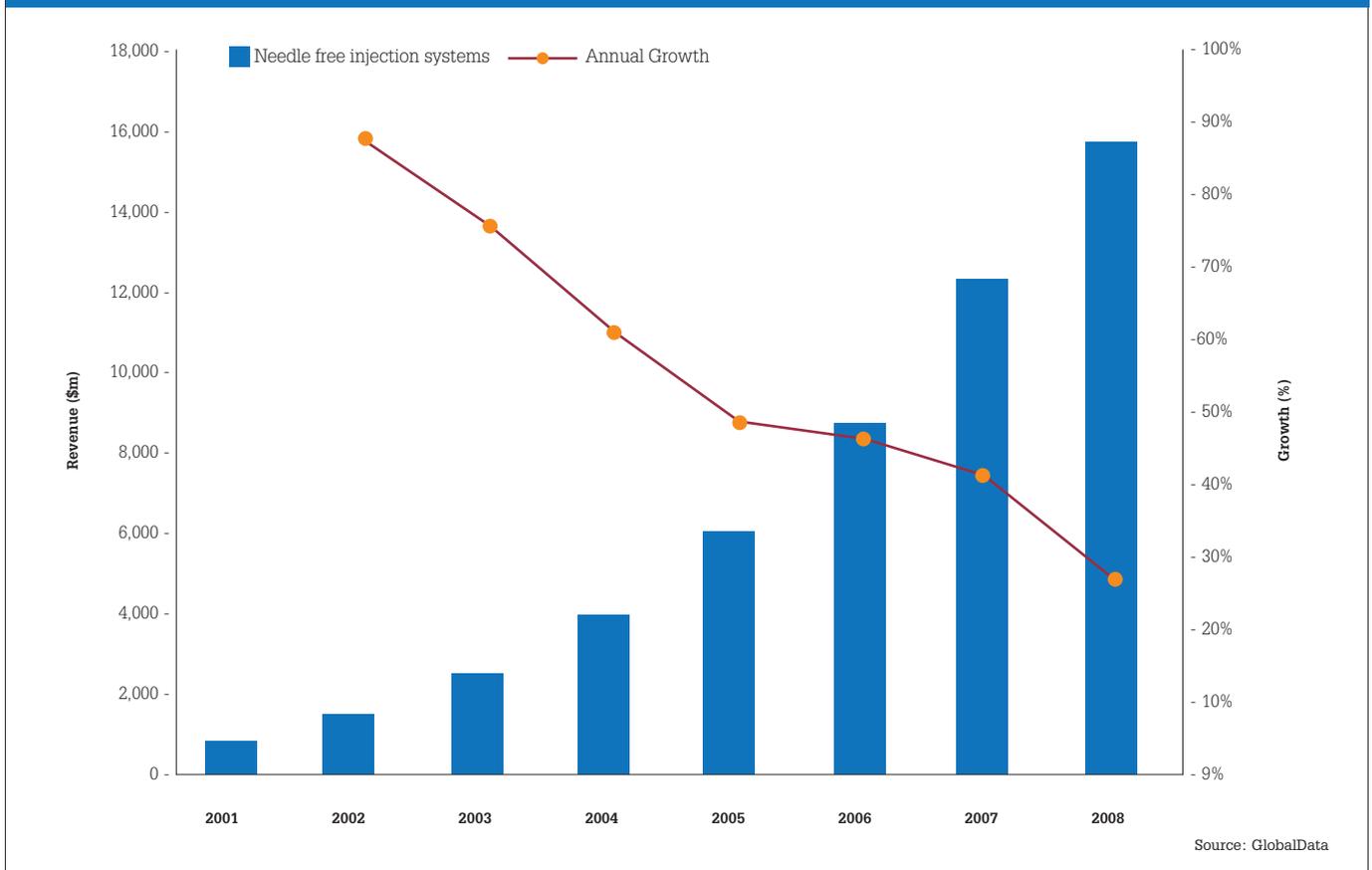


Figure 2. Needle-free injection systems, revenue (\$m), global, 2008-2015

“The global needle-free injection market was valued at \$6.7 million in 2001. Driven by the increased demand for painless delivery systems and their increased safety and efficacy, the market grew at a compound annual growth rate (CAGR) of 96.4% between 2001 and 2008, reaching sales of \$755.1 million in 2008.”

posed by traditional delivery methods., which include:

- overcoming patient aversion towards needles
- reducing the risk of infections
- painless drug delivery
- formulations designed to gradually release injected drugs, thereby reducing the frequency of injections
- ease of use.

Needle-free injection systems were developed in the 1930s and used for small pox, measles and polio vaccinations. These devices used mechanical compression, created by propellant gases, to force the solution through the skin; an example is the carbon dioxide gas cartridge. A needle-free injection system consists of an injection device, an air cartridge and a disposable needle-free syringe, but the syringe is the only part of the system that comes in contact with the skin. The injection device and the disposable syringe are plastic. Although the initial adoption of needle-free systems was slow due to high start-up and maintenance costs, they are fast catching up, bringing the

advantages of precise dosing and reduced risks of cross-contamination with them. Needle-free injection systems are also being widely used for intradermal administration of drugs, vaccines, hormones and anaesthetics. They are also beneficial in preparing hazardous injections like cytotoxic chemotherapy injections, thereby reducing accidental operator injury and environmental hazards.

Needle-free technologies can be broadly separated into three types: powder injections, liquid injections and depot (or projectile) injections. All work on the same basic principle of delivering medication by pressurised contact of fluids with the skin. In powder injection systems, a pre-measured powdered medication is put in a drug cassette which is opened by the compressed gas, delivering the medication is delivered to tissue. The powders used in these systems need to be a specific size and have specific properties to ensure their stability and proper dispersion into tissue. Depot injections are given in the muscle, where they create a store of a drug that is released continuously over a specified period of time. >>

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Cross-country analysis

The US remained the leading country within the global needle-free injection systems market in 2008. It is forecast to grow at a CAGR of 29.9% between 2008 and 2015, reaching \$3 billion in 2015. The US experienced high growth in this market between 2001 and 2008 compared to other countries, due to a favourable reimbursement policy and country's high acceptance of new and effective technologies.

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The Japanese market was valued at \$89.3 million in 2008 and is the largest market for needle-free injections outside of the US. This market has experienced a relatively high CAGR historically, and the same is expected to continue in the future despite the economic recession. This due to a large proportion of its population having health insurance.

The top five European nations – France, Germany, Italy, Spain and the UK – have all experienced relatively high CAGR historically. But the effect of the economic recession is expected to have limiting impact on the market growth due to a decline in R&D investments. They are expected to grow with relatively lower CAGR in the 2008-2015 period than the 2001-2008 period.

Market drivers

Increasing demand for painless drug delivery will drive the growth of this market. The availability of needle-free injection systems for the insulin delivery has indirectly increased demand for needle-free systems in the non-insulin delivery market. Though Exubera, an orally deliverable insulin, did not succeed on the market, it did generate huge interest in unconventional drug delivery systems. This has furthered investments into R&D of novel drug delivery technologies.

Another important factor that has led to this sudden growth of novel delivery technologies is their increased safety and efficacy compared to conventional methods of drug administration. Positive clinical trials results have buoyed physician acceptance and recommendations of these devices.

The advent of biologics and biotechnology-based compounds that need to be delivered using specialised delivery systems has also fuelled the demand for innovative and effective delivery devices. Acceptance by patients and healthcare professionals, coupled with a growing demand for minimally invasive delivery methods, will encourage growth in the years to come.

A growing number of clinical situations now demand a more sophisticated delivery system for effective treatment; for example, newer drugs with large molecules that are poorly absorbed by the gut wall or suffer substantial degradation by digestive enzymes. In addition, a limitation of oral delivery is that the dosage is systemic rather than directed to a particular organ, and therefore drug concentration is only at the optimal level in the body for a limited time. This need for specialised drug delivery devices for new drugs and therapeutics will also drive the growth of needle-free systems.

Drug counterfeiting is a growing problem, but one that can be combated using micro and nanotechnology to create sophisticated delivery devices, or nanoparticle labelling in the

drug formulation process. The increased use of such delivery systems by pharmaceutical companies to protect their intellectual property will also drive growth in the drug delivery device market. Likewise, a shift from professional to home administration in the past five years is also expected to have a stimulating effect on the needle-free injection market.

Common delivery systems for popular drugs need to be developed; the lack of such devices will limit the growth of this market. All in all, drugs delivered through specialised drug delivery systems will be costlier compared to traditional ones. The growing popularity of transdermal patches, naso buccal delivery systems and ocular delivery systems will also have a limiting effect on this market.

Outlook and implications

The future of needle-free injection systems looks bright, with a steady growth due to increasing demand for prevention of needle stick injuries and painless delivery of medication and this fact is further strengthened by the strong clinical trial data available. The needle-free injection system market will be dynamic with a large array of innovative products in pipeline by various start-up companies, giving a good scope for consolidations.

The favourable reimbursement scenario and fewer regulatory hurdles encountered by these devices owing to its non-invasive nature will further the growth opportunities and will make the needle needless in the future. ■