ALTERING PATIENT TREATMENT: HOW SC DELIVERY CAN HELP PATIENTS MANAGE CHRONIC CONDITIONS

Here, Victoria Morgan, Director of Segment Marketing, Biologics, at West Pharmaceutical Services, looks at the benefits of combining an active pharmaceutical product with a novel subcutaneous delivery device, and highlights some of the partnerships West has with biopharmaceutical and other companies, which have led to market launches of products incorporating its on-body delivery system.

In recent years, the pharmaceutical industry has become steadily more patient centric. The impact can be seen in nearly every aspect of the industry – from regulatory guidance, trial design and drug delivery to new drugs proliferating the pipeline, such as biologics. Biologics are helping to revolutionise the treatment of chronic diseases such as multiple sclerosis and other autoimmune diseases – by helping patients take less frequent injections. Additionally, by targeting specific components of a disease in ways never thought possible before, these therapies may also help some acute conditions, including certain types of cancer, become manageable chronic conditions.

“There is a paradigm shift underway in terms of what is possible in a pain-tolerant larger-volume injection.”

Figure 1: Number of NME SC biologics programmes in the clinic.¹
A real focus of biologics research and development lies in new molecular entities which can be administered into the subcutaneous (SC) tissue. Therapeutic areas such as growth hormones and diabetes have long shown efficacy through SC delivery and an established patient acceptance of self-injection and pain tolerance. These therapeutic areas are rapidly being joined by oncology, and autoimmune and blood disorders, which traditionally had IV and infusion as the main routes of administration but which are now seeing novel drug launches with SC delivery routes (Figure 1).

**THE SC SPACE IS NO LONGER THE NEW FRONTIER**

Administration of large-volume medicines has always been a challenge – one that has traditionally forced many drugs to be formulated into the <1 mL space. This was the approximate volume which would be tolerated by the patient while still being an efficacious dose. Yet there is a paradigm shift underway in terms of what is possible in a pain-tolerant larger-volume injection – all because of new ways of accessing the SC space.

Whereas intravenous (IV) infusions usually have to be administered in a hospital or a doctor’s office, SC administration may be performed by a healthcare professional at the patient’s home or even by patient self-administration. SC administration helps to treat patients with poor venous access or to spare patients’ venous capital. SC administration is of particular benefit for long-term or chronic drug treatments. In addition, SC administration may be better tolerated, compared with IV administration, as the slow absorption may abrogate side effects related to high serum concentrations.

**LET’S TALK SUBCUTANEOUS**

For patients diagnosed with haemophilia A, a typical treatment regime would be octogon alpha every 48 hours, with numerous injections to treat on-demand bleeds. The total number of injections each week could easily be more than 10. Patients diagnosed with multiple sclerosis may relapse when adherence to therapeutic regimens wanes, forcing a 3–5 day hospital stay for IV steroids.

While some diseases have moved the needle forward in terms of patient compliance – such as the regular use of insulin pens in diabetes – many people worldwide still suffer from the daily reminder and pain of their injections. The SC space allows us to think differently about how a patient perceives his or her illness by allowing larger volumes to be administered less frequently. When patients are not frequently reminded of their condition, adherence can be improved. Pharmaceutical companies recognise this, as do regulators, as evidenced by the increasing number of SC product approvals per year (Figure 2).

**DELIVERY DEVICES AS PART OF A COMBINATION PRODUCT**

Combining an active pharmaceutical product with a novel SC delivery device makes joining the world of combination devices a well-timed move. Precedents have been set by Amgen with the launch of Onpro®️, an on-body injector presentation of Neulasta®️ (pegfilgrastim) for neutropenia during chemotherapy, as well as Pushtronex®️ single-use on-body infuser containing Repatha®️ (evolocumab) for hyperlipidaemia.

Amgen’s on-body infusion incorporates West Pharmaceutical Services’ wearable drug delivery platform – the first generation of which was the first of its kind to be US FDA approved in combination with an approved drug. These combination products have revolutionised the way a patient visualises their illness as they enable the patient to home administer their treatment, thereby avoiding a repeat trip to the hospital or clinic.

**FROM DEVICE TO PLATFORM**

In the drive to formulate biologics for patient adherence, higher volumes and higher viscosities are typical product profiles of many SC drugs. However, higher viscosities may not allow for conventional delivery due to the need for longer injection times to reduce patient discomfort. West recognised this trend and

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"Amgen’s on-body infuser incorporates West’s wearable - the first generation of which was the first of its kind to be FDA approved in combination with an approved drug."
West Pharmaceutical Services responded by developing its SmartDose®
drug delivery platform, which includes a
first-generation device that allows up to
3.5 mL of liquid drug to be administered
over a longer period.

First, human trials were conducted
between 2011 and 2014, and development
on wider-platform offerings – including
large volume and preloaded options –
started soon after. With Amgen’s FDA
approval in 2016, EMA approval in 2017
and Japan/rest of the world approval in
2018, global acceptance of combination
products has begun.

The SmartDose® platform has expanded
with a user-loaded second-generation up to
10 mL device which leverages the success
of the first-generation device with proven
engineering and industrialisation on a
larger scale. With options available for dose
volumes up to 10 mL, the second-generation
SmartDose® device can adapt to a variety of
drug delivery needs (Figure 3).

**REASSURANCE OF KNOWING
DEVICE IS PATIENT FRIENDLY**

In the words of poet Alexander Pope in
1711, “to err is human” and this is still
very apt in 2019 when we think about
human factors and user error. The simplest
of devices in the hands of device engineers
can become a behemoth in the hands of a
patient – hence the importance of human
factors in Phase III trials.

Extensive human factor studies and user
interface development have been done by
West using the 10 mL user-loaded second-
generation SmartDose® device. This work
included body mass index (BMI), age and
previous injection experience – with people
who were patients (and took injections)
and healthy volunteers (who did not take
regular injections). The design usability,
acceptability and comfort were assessed,
along with establishing whether the user
needs were addressed and what the monthly
dosing preference was.

The results showed that the second-
generation SmartDose® 10 mL device
had a well-received on-body size and
was intuitive, easy to use and desirable.
When treating a chronic condition with
the need for an 8 mL monthly dose, seven
total treatment options were evaluated.
The second-generation SmartDose® 10
mL device was voted the most preferable
treatment, compared with the other
treatment options, which included weekly
autoinjectors, monthly dosing via multiple
autoinjectors, visiting a clinic or via
infusion. Patients don’t like taking
frequent injections and a second-
generation SmartDose® 10 mL device
monthly injection helped them with less
frequent injections.
CUSTOMERS CHOOSE SMARTDOSE® DRUG DELIVERY SYSTEM

In January 2019, scPharmaceuticals (Burlington, MA, US) announced it had signed a development agreement with West Pharmaceutical Services to incorporate its SmartDose® drug delivery system for delivery of FUROSCIX® (furosemide) – scPharmaceuticals’ lead programme for the treatment of oedema in patients with heart failure. scPharmaceuticals selected the SmartDose® drug delivery system for FUROSCIX® based on, in part, the features and functionality it offers for improving the overall patient experience.

During its recent investor day, Alexion Pharmaceuticals (New Haven, CT, US) announced that it had chosen the SmartDose® drug delivery platform for its clinical trial programme for the delivery of ULTOMIRIS® (ravulizumab-cwz) once-weekly SC injections. West and Alexion have signed a development agreement for the first-generation SmartDose® and potentially for second-generation development for exclusive use to deliver Alexion’s ULTOMIRIS® clinical development programme. ULTOMIRIS® is used in the treatment of paroxysmal nocturnal haemoglobinuria (PNH) – a chronic and debilitating, potentially life-threatening ultra-rare blood disorder. Using the SmartDose® drug delivery platform, the drug has the potential to be the first-to-market SC option for PNH and atypical haemolytic uraemic syndrome.

SMARTDOSE® MAKES DEVELOPMENT EASIER

By partnering with West for an Integrated Solutions Program that includes regulatory support and clinical filling of SmartDose® device cartridges, customers can ease their path to market for combination products. In 2019, West announced it had commenced discussions with Swissfillon (Visp, Switzerland) – a provider of aseptic fill-and-finish services to pharmaceutical and biotechnology companies – that are intended to lead to a non-exclusive global collaboration to provide fill-finish capabilities to customers using the SmartDose® platform for complex molecules.

Through the collaboration, it is anticipated that West will be able to deliver an integrated solution with filled Daikyo Crystal Zenith® cartridges for the SmartDose® wearable device, which is expected to accelerate clinical development and enable customers to bring their innovative injectable drugs to market quickly. This new collaboration is expected to offer customers a robust fill-finish capability later this year.

AIMING FOR SUCCESS

Patients have never before been on the receiving end of such a rapid wave of advanced therapies – and biologics are at the heart of this wave. However, the ever-increasing list of demands a biologic drug places on drug developers is a significant challenge. In a price-sensitive, patient-centric world, value has never been more necessary. Working with a partner, such as West, which has proof of performance and a collaborative spirit can help navigate the challenges found along the drug development road. Let us help you to improve your patients’ outcomes, avoid costly delays to launch and provide a better return on investment. By choosing the SmartDose® drug delivery system, you choose to improve the treatment experience of your patients as they confront their illness.

ABOUT THE COMPANY

West Pharmaceutical Services, Inc. is a manufacturer of packaging components and delivery systems for injectable drugs and healthcare products. Working by the side of the world’s leading pharmaceutical, biotechnology, generic drug and medical device producers from concept to patient, West creates products that promote the efficiency, reliability and safety of the global pharmaceutical drug supply. In addition, West provides a comprehensive Integrated Solutions Program that combines high-quality packaging and delivery systems with analytical testing, device manufacturing and assembly, and regulatory services to support customers throughout the drug development lifecycle.

West is headquartered in Exton, PA, US, and supports its customers from locations in North and South America, Europe, Asia and Australia. West’s 2018 net sales of US$1.7 billion reflect the daily use of approximately 112 million of its components and devices, which are designed to improve the delivery of healthcare to patients around the world.

REFERENCES


ABOUT THE AUTHOR

Victoria Morgan has been in the pharmaceutical industry for more than 25 years with extensive experience in the area of injection drug delivery products, such as primary packaging and combination products for vial, prefilled syringe systems, cartridges and devices. Throughout her tenure at West, she has served in various functions across sales and marketing. Ms Morgan spent more than 17 years in global sales roles, with her most recent position being Director of Segment Marketing, Biologics, where she has responsibility for global biological strategy development and implementation.
The first combination product that incorporates the
SmartDose platform technology was recently approved
by the US Food and Drug Administration (FDA)

Thousands of doses have been administered using the
SmartDose platform

Proven engineering, manufacturing and regulatory
expertise to support your needs

User-centered design

Connectivity to a variety of software platforms

Able to link with adherence solutions

Onboarding and training solutions available

Address a variety of delivery times through
adaptable, pre-programmable technology

Maximize patient comfort through
pre-programmable delivery times

West seeks partners for its SmartDose platform. This platform is intended to be used as an integrated system with drug filling and final assembly completed by the pharmaceutical/biotechnology company.

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