

OPINION

Connected polymeric drug delivery systems: A promise for the future!

Thomas Chandy

Design Development Center, Phillips Medisize, 1201 Beaudry Blvd, Hudson, WI 55016, United States;
chand025@yahoo.com

ABSTRACT

Subcutaneous (SC) drug delivery is one of the best routes of drug administration to patients over intravenous (IV) administration, due to the ease of application and patient acceptance. The main limitation of using SC route is administering larger volumes of drug, greater than 3–5 mL for therapeutic dosages. The wearable injectors, on body devices is an attractive option for larger volume drug delivery to patients. Thus, the need for self-administration strategy at the safety of home is growing faster, and is required for the next level of time-dependent and high-volume drug delivery. The advances for low cost, connected on-body delivery systems hold great opportunity for the novel ways of delivering home based drug therapy, in the future to come.

Keywords: SC drug delivery; wearable injectors; remote patient monitoring; connected drug delivery device; home healthcare

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Remarkable advances in polymeric biomaterials^[1], nano/micro technology, biotechnology and Artificial Intelligence (AI) have led to the development of various medical devices for real-time monitoring of human activities, as well as transdermal delivery of drug molecules^[2,3]. Transdermal or SC delivery systems is able to continuously transport therapeutic agents across the skin and found to have several advantages over intravenous administration, improved patient experience, safety and reduced treatment burden, resulting lower healthcare costs. Several patients suffer from chronic illness and manage their health conditions via daily medications. This may oversight the need of novel ways of treatment regime for better patient care and home-based therapy systems.

The advent of novel polymers and their use in drug delivery systems have been achieved great development in the last two decades. Polymeric drug delivery can be a drug in micro/nano capsules as a formulation or a device that enables the introduction of a therapeutic substance into the body^[4,5]. The major advantage of using controlled delivery systems can include the maintenance of drug levels within a desired range, the need for fewer administrations, optimal use of the desired drug and increased patient compliance^[2,3]. The emergence of connected drug delivery devices, allows the tracking of active drug principles and communication between doctor's office are of immense use in minimizing the costs of unmet health conditions.

SC drug delivery is the preferred option for therapeutic drug delivery to patients due to their ease of use, comfort, safety and acceptance and drug availability. However, the SC delivery has major

limitation in the amount of drug substance that can be delivered to the body in a single injection. Normally, the amount of SC injection has been limited to 1–2 mL, to prevent leakage of active ingredient from the injection site. The advent of wearable on body devices has the ability to deliver over 50 mL of prefilled and preconfigured drug to patients as a fully integrated ready to inject system^[2]. The use of wearable injectors, configured with Bluetooth that provides the customer with significant opportunities to improve connections with patients and doctor's clinic for better therapeutic applications. The use of connected drug delivery devices has changed the patient life to safe use of therapeutic agents confidently, getting injection reminders and prompts, access to historic data regarding their therapy regime with accurate technical information. It is apt to think about the use of on body delivery systems, can be the move of treatment options from hospital to the home, reducing costs, and patients getting more favorable treatment option for adhering to chronic maintenance therapies^[6,7].

The major disadvantage of using connected technology to drug delivery monitoring is the cost factor of getting configurations with integrated Bluetooth, which provides connections with patients and prescribers. However, the cost of such connectivity can be reduced with the development of novel manufacturing technology and finding new materials and design concepts on devices for the future to come. In addition, in-depth studies on novel polymeric materials for packaging and manufacturing technologies are needed to enable the development of low-cost, miniaturized, lightweight combination medical devices, for long-term monitoring and feedback-controlled therapy.

Conflict of interest

The author declares no conflict of interest.

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