

SAY "NO MORE" TO NEEDLES: NEEDLE-FREE SELF-INJECTION TECHNOLOGY FOR PAINLESS, BETTER CARE

In this article, Alina Su, Chief Executive Officer and Co-Founder of NovaXS Biotech, discusses the need for improved and optimised remote healthcare to meet current challenges in the industry, and introduces Telosis, the company's patent-pending connected needle-free injection device that is poised to provide answers to these challenges.

Imagine being diagnosed with a chronic illness and learning that the only way to treat it is to inject your medication, often over a course of years. This is the case for millions of people worldwide, who face the pain, stress and confusion related to needle injection therapies. That's why NovaXS, a smart medical device company, set out on a mission to make medication self-administration easy and accessible.

THE PROBLEM: SELF-INJECTING TECHNOLOGY MEDICATIONS CAN BE UNCOMFORTABLE AND OVERWHELMING

Fear, pain and stress are emotions that people living with chronic illnesses, such as diabetes, infertility, allergies and growth hormone deficiencies, face daily due to their needle injection treatments. NovaXS is creating a better way to treat patients with chronic diseases by building a smart needle-free injection device called Telosis, which will be able to sync with a smartphone app.

When it comes to treating chronic conditions with injectable medications, there are three common points of friction for patients:

1. **Needle phobia:** Needles can cause psychological fear and 80% of patients

"A fear of needles, complicated treatments and lack of monitoring all add up to increased healthcare costs."

would prefer an alternative to needles due to the pain and skin irritation they cause.

2. **Complicated treatment management:** Managing the whole self-injection process, from drug preparation to drug administration, can be complicated.

3. **Lack of treatment monitoring:** There is a clear informational gap between providers and patients in remote healthcare settings, potentially leading to an increased risk of administration errors and low therapy adherence.

A fear of needles, complicated treatments and lack of monitoring all add up to increased healthcare costs. According to the US Centers for Disease Control,¹ one in four adults and two in three children have a strong fear of needles and, according to the National Association of Chain Drug Stores,² 50% of patients do not take medications as prescribed. According to a Patient Safety Network study,³ the error rate of self-medication in at-home treatment is up to 33%, which means that up to a third of those who actually take their medications do not do it correctly. The consequences of this are real – pain, confusion, frustration, people not getting better and healthcare costs adding up.

THE SOLUTION: THE NOVAXS NEEDLE-FREE INJECTION SYSTEM

Over the last year, NovaXS has developed patent-pending technology, with the hope of introducing potentially life-changing drug delivery methods for injectable medications to the market to help treat chronic diseases and improve adherence. NovaXS aims to make at-home remote treatment monitoring possible through an advanced needle-free drug delivery platform. The technology is



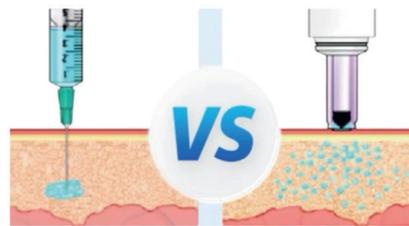
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“The NovaXS drug delivery platform, Telosis, consists of a smart needle-free injection system that simplifies the medication self-administration process and improves remote treatment outcomes.”



- Diffusion > injection
- Improved absorption rate

Figure 1: The drug delivery platform includes automatic medicine-drawing and air-expelling technology, an external motor and vertical alignment with a safety lock.

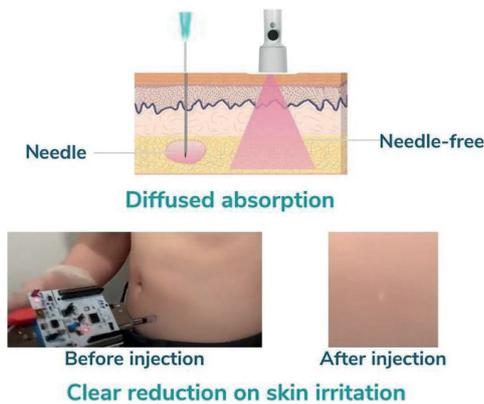
not exclusive to one type of treatment – NovaXS is developing solutions for patients with diabetes, infertility, growth hormone deficiencies, allergies and more.

The NovaXS drug delivery platform, Telosis, consists of a smart needle-free injection system that simplifies the medication self-administration process and improves remote treatment outcomes (Figure 1). Patients will be able to use Telosis to administer a narrow stream of medication without the need for a needle. The needle-free syringe uses liquid pressure to deliver medication into the subcutaneous or intramuscular space in just 0.3 seconds (Figure 2). The external motor design makes it possible for automatic medicine-drawing and air-expelling technology to simplify treatment preparation. The vertical alignment and safety lock prevent the medication from leaking and can minimise the pain associated with injections.

The medication administration process for NovaXS is:

- Draw medication from the vial
- Expel the air bubble in the cartridge
- Verify the dosage volume
- Administer the medication and track treatment progress with one simple click on the device.

Physicians will be able to track their patients’ progress and analyse injection



Needle-free technology improves the patient experience of self-injections by completely eliminating the needles, and at the same time, it has shown a better medication absorption rate and bioavailability enhancement based on numerous studies.

Figure 2: Telosis uses diffused absorption in its needle-free technology.

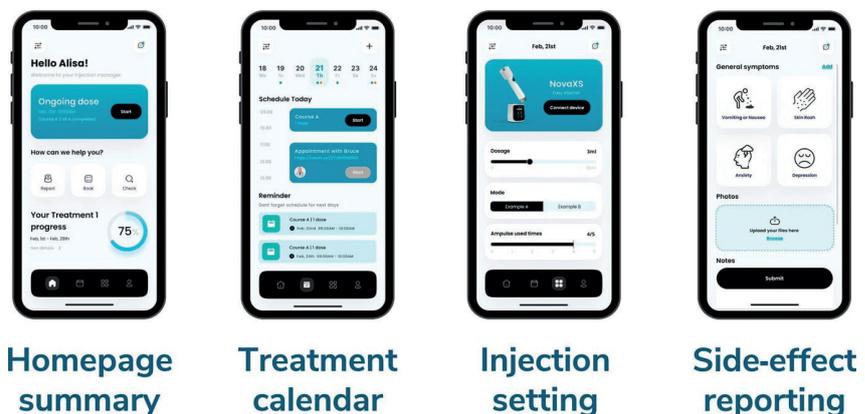


Figure 3: NovaXS’s drug delivery platform includes an app that summarises treatment progress, treatment calendar, injection setting, side-effect reporting and more.

data to help patients make smarter health decisions. This all happens through integration with the Internet of Things (IoT) via a smartphone app. By including connectivity in this way, NovaXS can collect injection data, send patients reminders, monitor treatment progress and visual treatment calendars, and streamline communication between patient and

physician to maximise remote healthcare adherence and prevent complications (Figure 3). Additionally, NovaXS integrates the medication adherence data collected from Telosis with other remote patient monitoring devices, such as wearable devices and glucose monitors, which can provide patients with the tools they need to take early interventions for preventive care.

The smartphone app’s treatment calendar is generated based on the patient’s e-prescription and an injection reminder can be sent as a push notification to their phone prior to each injection. Injection data is collected by the device to inform healthcare providers of personalised treatment plans. Additionally, patients can communicate and report any side effects to their healthcare provider via their phone.

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LOOKING TO THE FUTURE OF REMOTE DRUG DELIVERY

For chronic diseases that require frequent injections, remote healthcare is the clear trend for the future. Many companies are already taking steps to provide remote patient monitoring as part of their product offerings as they look to tackle staffing shortages and other challenges in today's healthcare industry. However, NovaXS sees an opportunity for its platform to monitor and improve the adherence of these remote treatments. The company's initial target therapeutic areas include diabetes, severe obesity, severe asthma, migraine, growth hormone deficiency and infertility, amounting to over 90 million patients in the US (Figure 4).

Looking towards the future, as insurance companies shift from pay-for-visit to pay-for-outcome models, remote therapeutic monitoring codes are enabling the reimbursement of medical devices that collect remote therapy adherence data and deliver better care. Nowadays, over 21 million people undergo injection therapies. In 2021, the total available market size was valued at over US\$620 billion (£502 billion).⁴ There is a clear trend that care providers and patients are looking for more convenient and effective delivery methods for



Diabetes

9.1 million US patients required insulin treatment



Allergy

73% of patients have been prescribed with immunotherapy



Growth hormone

64,600 patients annually receive HGH treatment



Regenerative medicine

DNA vaccine, muscular atrophy, Duchenne muscular dystrophy

Figure 4: Nova XS is targeting markets including diabetes, growth hormones, allergies, regenerative medicine, infertility and others.

injectable treatments that improve adherence and the patient experience. To meet this need, NovaXS's approach emphasises a patient-centric approach to making self-injections easy and centres remote healthcare optimisation.

ABOUT THE COMPANY

NovaXS Biotech is on a mission to make medication self-administration easy, simple and convenient for patients. Led by a professional team of healthcare experts with a proven track record of fundraising over \$40 million and five successful business exits, Nova XS is a smart medical device start-up focused on advanced drug delivery and patients' long-term health. Its patent-pending technology, Telosis, is a needle-free drug delivery platform that

allows patients to self-administer biologics subcutaneously or intramuscularly and track long-term treatment progress through IoT integration and a software app. NovaXS is enrolled in the Berkeley SkyDeck, mHub MedTech Accelerator, USC Troylabs and Newchip Accelerator programmes and its investors include Baxter, Edward-Elmhurst Health, Courtyard Ventures, mHub Product Impact Hub, Newgen Venture Partners and others.

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ABOUT THE AUTHOR

Alina Su, Chief Executive Officer and Co-Founder of NovaXS, is an innovator who is passionate about creating technology that makes healthcare equal and accessible to all. An entrepreneur and inventor, Ms Su holds six medical device patents in China and the US with three more patent applications pending. She is a PhD student studying Biological and Biomedical Science at Harvard Medical School and holds a BS in Bioengineering and Biomedical Engineering from the University of California, Berkeley. Ms Su has held researcher roles at Quantitative Biosciences Conboy Labs, UCSF Catalyst Program, Cellular Biomedicine Group and Serrento Therapeutics. She is the author of numerous scientific publications.

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