

RAPID DOSE THERAPEUTICS, CANADA

ORAL, FAST-DISSOLVING, DRUG DELIVERY SYSTEM MIMICKING INTRAVENOUS INJECTION

Challenges



- Oral drug delivery is the most common form of drug delivery; however, it has a slow uptake and also it goes through the first pass metabolism. Intravenous is a faster form of drug delivery; however, it requires a care giver to deliver and is also associated with needle stick injuries.
- Researchers are looking into developing innovative faster drug delivery solutions.

Company Profile

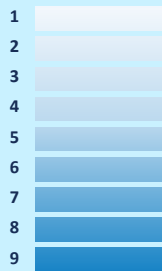


- Rapid Dose Therapeutics is a Canada-based pharma-technology company that has developed an oral fast dissolving drug delivery system.
- Besides its proprietary technology, it also provides product innovation, production, and consultation to the pharmaceutical and healthcare manufacturing industry.

Technology Profile and Technology Readiness Level



- The novel oral fast-dissolving drug delivery system called QuickStrip™ consists of a film forming agent with embedded micronized therapeutics, allowing quick delivery of poorly soluble as well as large therapeutic molecules such as proteins or complex molecules. The active molecule dissolves in a few second and reaches the blood stream.
- The company has implemented this technology in vitamins as well as cannabis products.



Growth Opportunities Across Industries/ Applications



This drug delivery system can be applied to a list of pharmaceuticals, emulsified oils, and range of over-the-counter medicines.

The over the counter products offered by QuickStrip™ include

- QuickStrip™ Energy, which provides naturally derived small doses of caffeine.
- QuickStrip™ B12 which delivers B12 into the system.
- QuickStrip™ Sleep which delivers melatonin inside the body quickly.

Drug Delivery of OTCs



Benefits



- The active ingredient has rapid dissolution through the sublingual and transmucosal mode of drug delivery. It directly enters the blood stream without being degraded through the liver metabolism.

- For pharmaceuticals, it offers a very simplified drug delivery, especially for pediatric patients or elders, who have problems swallowing. For patients with neurological conditions, dysphagia is common so this QuickStrip™ / PharmaStrip™ is extremely useful. It addresses the phobia to pill issues and improves patient outcomes.

ONDOSIS, GOTHENBURG, SWEDEN

INTELLIGENT DRUG DELIVERY SYSTEM TO DELIVER INDIVIDUALIZED MEDICATION

Challenges



- The pharmaceutical industry is experiencing significant innovations, but accurate dosing of the medications remains a major unmet need of the market.
- Dose titration, non-adherence, and risk for abuse are the other current issues faced in the healthcare industry.
- Innovative medical technologies that can deliver tailored oral medicine doses, and support remote adherence monitoring to improve outcomes are required.

Company Profile

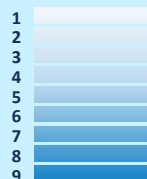


- Founded in 2017, OnDosis is a medical device company developing intelligent and flexible drug delivery technology for personalized medicine delivery.
- The company's mission is to help people in getting better everyday life by leveraging individualized, adjustable, and correct doses of medicines.
- The company is currently focusing on high burden diseases such as rare diseases, cancer, and epilepsy.

Technology Profile and Technology Readiness Level



- OnDosis is developing proprietary technology. OnDosis 1, that offers flexible dosing options of oral medicines. The prescription treatment offers particles of drugs instead of pills and tablets for the patients. The device connects to an external smartphone to monitor medication adherence.
- The device can be explored for its application in different compounds and formulations, and the company customizes it based on their partner's requirement.



Growth Opportunities Across Industries/Applications



- The drug delivery device developed by the company can be used in multiple diseases with significant healthcare burden such as rare diseases, cancer, Parkinson's disease, attention deficit hyperactivity disorder (ADHD), and epilepsy.
- The device developed by OnDosis can be used to test and monitor the effects of investigational drugs developed by biopharmaceutical companies in clinical trials.

Funding and Future Work



- OnDosis has raised a total amount of \$14.6 million as funding since its inception in 2017. Aeternum Management (Norway) is the lead investor of the company.
- The company is seeking partnership with pharmaceutical companies to develop drug delivery devices that suit the medicines developed by them.

Application in multiple diseases with significant healthcare burden



Instrumental tool for effective clinical trials



CYGENICA PRIVATE LIMITED, INDIA

NON-TOXIC, INTRA-CELLULAR DRUG DELIVERY SYSTEM

Industry Trends/Challenges



- The industry is researching to develop a highly specific drug targeting and delivery method, however, toxicity has been of the major challenges for many of the advanced drug delivery systems.
- The industry is in need of a targeted but non-toxic drug delivery platform for improved clinical outcomes.

Institute and Technology Profile

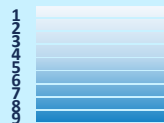


- Understanding the industry need, CyVec has developed a safe novel drug delivery platform for targeted intra-cellular drug delivery.
- This platform uses an engineered negatively charged protein molecule that uses a non-endocytic, helical way to permeate the cell membrane.

Technology Readiness Level



CyGenica's disruptive drug delivery technology is at the development stage. It seeks to partner with biopharmaceutical companies for further technology advancement.



Growth Opportunities Across Industries/Applications



CyVec drug delivery platform has tremendous growth opportunities for targeted delivery of a range of drug molecules such as small molecules such as chemotherapeutic drug or larger molecules such as proteins, or even small oligonucleotides, nucleotides.

Benefits



- The proprietary technology delivers targeted intracellular drug delivery (example nucleus or specific cell types), without causing any harm to the cell.
- It causes low immunogenicity and is non-toxic.
- It can be used for delivering cancer and genetic therapies, such as genes/RNAs/CRISPRs across cell membranes without causing cell damage and also without triggering any adverse immune response.



Cancer and Genetic Therapies

CyGenica is using the same concept to deliver CRISPR gene editing components. The process is called CyFect CRISPRGUARD. It is also developing a non-toxic cell labeling reagent called CyGlo that can be taken up by several cell lines, with the cell uptake of less than an hour, and can be used to label intra-cellular components.



CyFect CRISPRGUARD: Genome Editing



CyGlo: A Non-Toxic Cell Labeling Reagent

MIDATECH PHARMA, UK

IMPROVED DRUG DELIVERY TECHNOLOGY USING 3D PRINTING TECHNOLOGY

Industry Trends/ Challenges

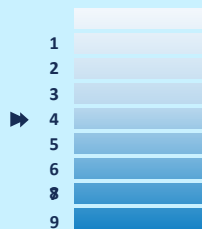


One of the advanced forms of targeted immunotherapy is using monoclonal antibodies. However, the traditional manufacturing process is not suitable for formulation of sustained long acting monoclonal antibodies and proteins. The biomanufacturing process doesn't allow the formation of microspheres, as the proteins are exposed to heat, shear forces, localized acidic environment, which leads to degradation of the protein.

Technology Readiness Level



The company tested its technology in in-vitro studies with positive results. It demonstrated that with encapsulation, the functional integrity and the antigen binding capability were not lost. The company plans to optimize drug loading and dissolution profile. Later, it will be testing the drug in in-vivo studies.



Benefits



- The novel 3D printing technology maintains the pH within the microspheres. The PLGA polymer depot system is free of toxic surfactants, solvents, heat or shear forces. The production method is highly scalable, has high yield, and doesn't use expensive sophisticated machines.
- With the Q-sphere technology, the extended dosing interval improves patient compliance to medication.

Institute and Technology Profile



- Midatech Pharma PLC is a biotechnology company focused on improving drug delivery. It has developed a novel Q-Sphera technology, which encapsulates a biologic to create a long acting injectable product.
- Using 3D printing technology, the active drug is encapsulated in polymer-based bioresorbable microspheres, which releases the drug over a week to several months in a sustained fashion.

Growth Opportunities Across Industries/ Applications



- The Q-Sphere is being investigated for drugs over a range of therapeutic areas.
- MTD201 is a long acting octreotide injection for endocrine disorder in phase 1.
- The technology is also being investigated for long acting, injectable, monoclonal antibodies.
- Other drugs encapsulated in pre-clinical studies are Brexpiprazole for central nervous disorders, and long- acting tacrolimus for anti-rejection.

Low

Medium

High

Long Acting Monoclonal Antibodies

E3D ELCAM DRUG DELIVERY DEVICES, ISRAEL

DISPOSABLE WEARABLE PATCH INJECTOR FOR BOLUS SUBCUTANEOUS ADMINISTRATION

Challenges



- Bolus, the delivery of a large dose of drug within a specified time, is useful when there is an immediate requirement of the desired biologic or drug in the blood circulation.
- Wearable patch injectors with preprogrammed injection time and delivery rates will increase the patient experience and comfort, and also its application for injection of various drugs.

Company Profile

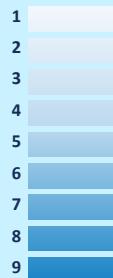


- Founded in 2015, E3D Elcam Drug Delivery Devices is a subsidiary of Elcam Medical Group, a global medical device company.
- The company focuses on designing and developing home-based drug delivery devices and technologies, such as auto-injectors/pens and patch pumps.
- It works with its partners from the development phase till the commercial supply.

Technology Profile and Technology Readiness Level



- OBI-1 is E3D's wearable patch injector, which can be used for bolus administration of biologics and other drugs, subcutaneously.
- The device is fully disposable and also can be easily filled with the drug.
- The injection can be administered at a predefined time and pre-programmed delivery rates.
- The product is under development currently.



Benefits



- It is easy-to-use and also safe for patients because of its easy installation and removal, intuitive user interface and operation, user feedback, compact size and protection of the needle before and after needle insertion while only a soft cannula remains in the tissue.

Opportunities Across Industries/ Applications

OBI-1 Wearable Injector will have high impact across:

Self-administration of bolus



- The ability to predefine the injection start time and delivery rates and the connectivity options are the attractive features of the OBI-1 device.
- The high level of patient safety and comfort experience with the innovation will also enable the adoption of the platform by biopharma companies.
- The compatibility with high viscosities also increases its applications.
- The globally established brand of Elcam will also enable its high commercial potential globally.

INSULET CORPORATION, MA, US

TUBELESS DISPOSABLE WEARABLE INSULIN DELIVERY DEVICE

Challenges



- Diabetes is a common healthcare problem, which requires proper management with frequent measurement of glucose and injection of insulin accordingly.
- Conventionally, insulin was delivered using daily injections where patient compliance is often poor. It is also a cumbersome procedure.
- Insulin is also alternatively delivered currently using pump system where the tubes are difficult to manage.

Company Profile

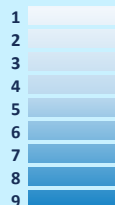


- Insulet Corporation, founded in 2000, is a medical devices company, which focusses on the development of wearable drug delivery devices.
- Omnipod Insulin Management System is its flagship product which is used to deliver insulin.
- The company also explores the use of the Omnipod platform for delivering non-insulin therapeutic drugs subcutaneously.

Technology Profile and Technology Readiness Level



- Omnipod DASH Insulin Management System, launched in the US in 2019, is a tubeless, lightweight, wearable and waterproof insulin delivery device, which can provide insulin delivery for 3 days.
- It consists of the wearable pod platform and a smartphone-like touch-screen Bluetooth-enabled controller, Personal Diabetes Manager (PDM), which calculates the required insulin dose using Integrated Bolus Calculator, Presets & CalorieKing.
- The cannula inserts automatically at the push of the button on the pod and the insulin delivery can be started by pressing “Start” in the controller.



Opportunities Across Industries/ Applications



Omnipod DASH will have high impact across:

Management of diabetes



- Omnipod DASH enables management of diabetes with minimal disruption of life of patients.
- Omnipod DASH is also integrated with Omnipod DISPLAY, which displays the PDM data in a smartphone, and with Omnipod VIEW, which allows caregivers to monitor the patient’s glucose levels and insulin bolus deliveries.
- The tubeless and light weight device is best suitable for pediatric patients.
- As Insulet Corporation is also exploring the use of the platform for other drugs, the application potential is also high.

Benefits



- The device enables diabetes management with patient comfort.

SUBCUJECT APS, DENMARK

AFFORDABLE WEARABLE BOLUS INJECTOR PLATFORM

Challenges

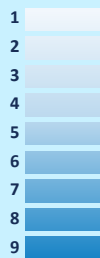


- Wearable devices are being developed for delivery of biologics and other drugs to treat several diseases, such as diabetes.
- In case of diseases requiring large volume of drugs, there is a requirement for controlling the flow rate of drugs as time is required for the tissues to absorb the injected drug.
- Complex mechanisms and expensive components are being employed in on-body injectors to achieve the stringent control of flow rate, which in turn increases the cost of the device.

Technology Profile and Technology Readiness Level



- Subcuject WBI is a low cost and patient-friendly wearable bolus delivery device, which uses a patent pending drug delivering technology.
- The devices has two chambers filled with liquid separated by a semi-permeable membrane wherein when salt is added to one chamber, it will result in drawing of liquid from the other chamber, which provides the hydraulic pressure to drive the plunger in the drug container.
- The simple driving mechanism requires low cost and few moving parts.



Benefits



- It is a pre-filled and pre-assembled device and can be disposed after a single-use.

Company Profile



- Subcuject, founded in 2017, is a medical device company focussed on developing wearable bolus injectors.
- Subcuject WBI is its flagship product.
- The company has partnered with Phillips-Medisize for the development, manufacturing, and commercialization of the product.
- The private company is primarily funded by Danish venture capital firms VF Venture and Capnova.

Opportunities Across Industries/ Applications



Subcuject WBI will have high impact across:

Wearable drug delivery devices



- Subcuject WBI is a low cost device, which can inject drugs of viscosities as high as 100 cP.
- Subcuject has developed a 3ml capacity wearable drug delivery device, and is currently developing a 5ml capacity device. It also plans to develop even higher volumes.
- As drug administration are often required often, the low cost of the wearable drug delivery device is very advantageous and can be expected to have a very high adoption rate.
- The company is looking for biopharma companies for partnership.

EYEPOINT PHARMACEUTICALS, MA, US

INJECTABLE SUSTAINABLE DRUG DELIVERY IMPLANT

Challenges

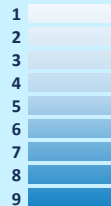


- Uveitis is characterized by redness, pain, and swelling of the eye and can lead to loss of vision, if left untreated.
- Chronic non-infectious uveitis occurs as a result of an injury or other diseases, such as HIV, multiple sclerosis, rheumatoid arthritis, and tuberculosis.
- Treatment include oral administration of steroids or immunosuppressants, and also implants.
- The condition can suddenly worsen or flare and also recur.

Technology Profile and Technology Readiness Level



- Yutiq is a fluocinolone acetonide (0.18 mg) intravitreal implant, which was FDA approved in 2018 and launched in the US in 2019. It is applied with a 25 gauge needle.
- It can deliver the drug in a sustained release for up to 3 years.
- The sustained release prevents the occurrence of peaks and valleys of the drug levels that can happen with conventional corticosteroid administration.
- The micro insert employs the Durasert drug delivery technology of the company.



Benefits



- The micro-insert can be injected for the treatment at the physician's office.

Company Profile



- Eyepoint Pharmaceuticals, founded in 1987, is a biopharmaceutical company focused on developing innovative ophthalmic products.
- The company uses two technologies, Durasert and Verisome, to develop new products to treat eye diseases.
- It has developed five FDA approved products till now, and two more products are under development.

Opportunities Across Industries/ Applications

YUTIQ will have high impact across:

Treatment of uveitis



- YUTIQ is easy to apply and uses the proven Durasert technology. While avoiding the side effects of very high drug levels, clinical studies have also shown that occurrence of flares and the recurrence reduces with YUTIQ and, therefore, the probability of vision loss due to uveitis. However, the adverse effects of steroid implants, such as cataract development and intraocular pressure, still remains with the device.
- Along with benefits, the proven technologies and devices of Eyepoint Pharmaceuticals will also enable the device to have a high adoption potential.