MIDATECH PHARMA

At A Glance

Q-Sphera™

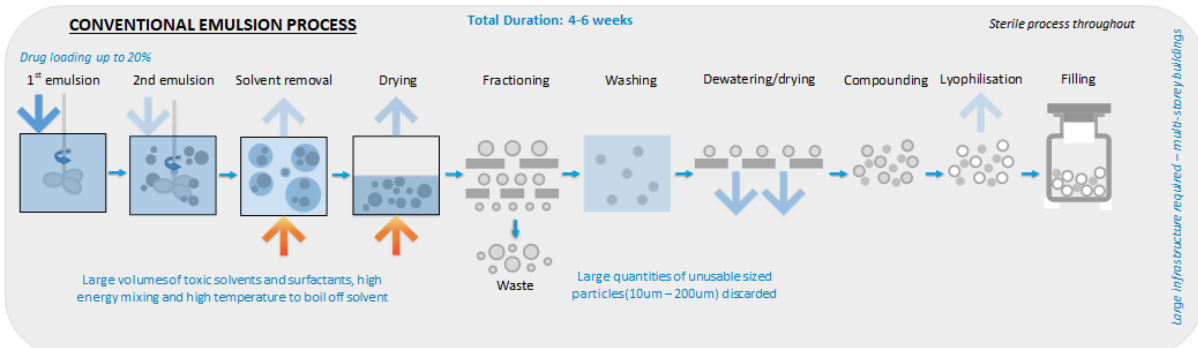
Next Generation Polymer Microsphere Technology For Extended Sustained-Release Release Medications

OVERVIEW

Midatech's Q-Sphera™ is an advanced microencapsulation and polymer-depot sustained release (SR) drug delivery platform produced using a novel and disruptive printing based process, with numerous and distinct advantages over conventional reactor based technologies. From a manufacturing perspective Q-Sphera™ is a precise, scalable, efficient, and environmentally friendly microparticle platform. From a clinical perspective Q-Sphera™ ensures monodispersed microparticles that release active drug compounds into the body in a superior linear tightly controlled and predictable manner over an extended period of time from 1 – 6 months

THE TECHNOLOGY

Current reactor based polymer microencapsulation emulsion technology has been in use for 30 years and, despite several failings, it continues to be used by 95% of the market as there are limited alternatives. The high energy demanding reactor based emulsion processes used by products such as Novartis SLAR, require large infrastructure, are inefficient and wasteful producing large quantities of unusable particles, and need large volumes of toxic organic solvents that are damaging to the environment. The **future printing based Q-Sphera platform** developed by Midatech uniquely addresses all these problems by using advanced printing technology that produces the microspheres at several million spheres per second, uses easily removable non toxic solvents that are kind to the environment, high efficiency and scaleability, and requires minimal infrastructure. The key advantages of Q-Sphera™ is product monodispersity and homogeneity, as the microencapsulating spheres are produced under controlled and identical conditions and exposure times. Very tight homogenous particle size distributions are produced, which increases the usable product yield and leads to far superior clinical profile and injectability characteristics compared to traditional emulsion manufacturing methods. As seen in the MTD201 Q-Octreotide product these include lack of dose dumping and burst, lower variability, reduced injection site pain, and use of much smaller gauge needles. The clinical result of the Q-Sphera process is a superior formulation that produces consistent and reproducible drug concentrations in the body within very narrow limits.



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THE VALIDATION

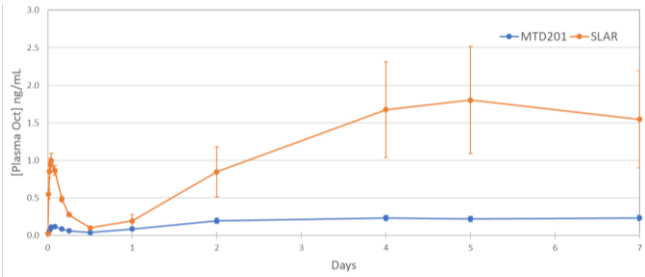
Disease

The first medical conditions to be treated with the Q-Sphera formulation technology are the hormonal tumour diseases Carcinoid and Acromegaly. This is a $2bn annual market dominated by Novartis Sandostatin LAR (SLAR™) for the past 20 years. Carcinoid is a disease of slow growing tumours derived from neuroendocrine hormonal secreting cells which is debilitating with high morbidity and mortality - 5-year survival 70% local disease, 44% if regional metastases, 20% if distant metastases. Acromegaly is a chronic disease characterized by hypersecretion of growth hormone, almost always due to a pituitary tumour. It is associated with increased morbidity and mortality usually due to significant cardiovascular and heart disease due to the excessive growth hormone levels. Octreotide mainstay of medical treatment for both carcinoid and acromegaly.

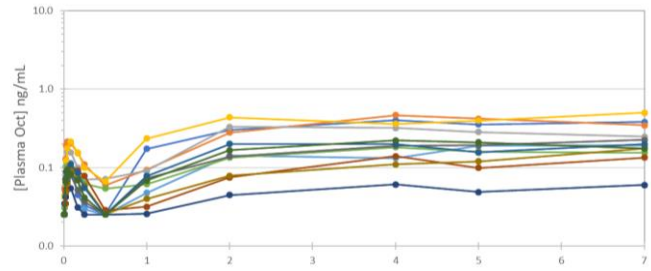
Clinical Data

A recent first-in-human phase I study compared Midatech's Q-Sphera™ MTD201 product with Novartis SLAR™ product. The results for MTD201 were impressive. Pharmacokinetic data looking at the amount of octreotide released from the microspheres into the blood demonstrated far smoother more controlled profile for MTD201 versus SLAR, characterised by no burst or dose dumping, lower inter- and intra- subject variability, and tight linear profiles. Pharmacodynamic data looking at the effect on growth hormone demonstrate that MTD201 normalises growth hormone to levels comparable or better than SLAR ™.

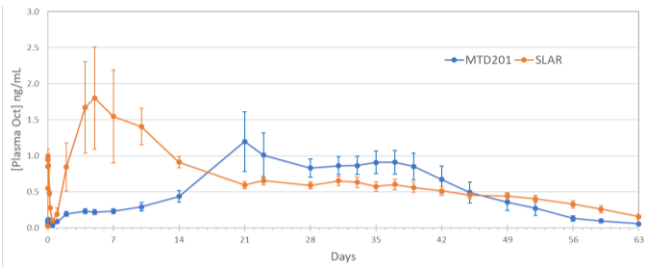
Octreotide Levels: All Subjects 0 – 7 days



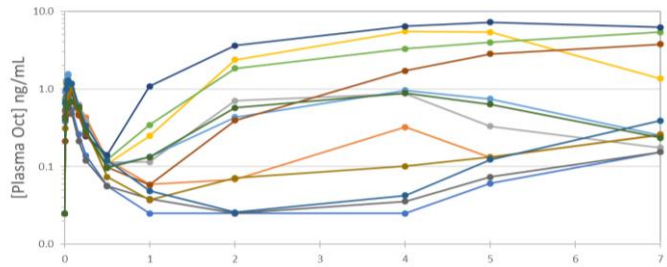
MTD201 Octreotide Levels: Individual Subjects 0 – 7 days



Octreotide Levels: All Subjects 0 – 63 days



SLAR Octreotide Levels: Individual Subjects 0 – 7 days



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Usability Data

The key aspects of usability are reconstitution and needle size.

Reconstitution: For SLAR™ the procedure to prepare the product for injection is a complex 30 step error prone process, taking up to 40 minutes and, once reconstituted, the product has to be given immediately to prevent solidifying and wastage of the injection. For MTD201™ Q-Octreotide the preparation process is a simple 5 – 7 minute procedure, after which the product is stable up to 2 hours. For the nurse preparing and giving the injection, the short and flexible process of MTD201™ has clear advantages over the all consuming SLAR process™.

Needle size: For SLAR, a large 19G needle is prescribed for the injection to prevent blockage, and often an even large 18G needle is required for successful injection. For MTD201 Q-Octreotide the precision microencapsulation technology means that a much smaller 21G needle can be used, and there are no blockages. Other Q-Sphera products use even finer needles as small as 27G. The importance of this is evident from the first-in-human phase I data where MTD201 had lower injection pain - 8% for MTD201 versus 25% for SLAR™, and much lower injection site tenderness - 8% for MTD201 versus 83% for SLAR.

In summary, the data suggests that MTD201 is a better product than SLAR™ with an improved clinical profile. As well as additional advantages around smaller needle size, simpler and more reliable reconstitution and injection.

MTD201 clinically favourable vs SLAR
- Very well tolerated
- Favourable growth hormone suppression
- No burst, no dose dumping
- Lower variability
- Lower injection pain and tenderness

MTD201 usability superior vs SLAR
- Smaller needle size
- Simpler and quicker reconstitution
- Fewer reconstitution errors and wastage
- No needle blockages thus no wastage (~30% for SLAR)

Technologically advanced Q-Sphera
- **Precision** encapsulation platform
- Full **control** over particle size monodispersity, and release kinetics
- High drug loading, minimal burst release, superior injectability
- Printing '000,000 particles per second
- No product discarded to meet particle size spec.
- Several opportunities beyond MTD201

PARTNERING

Q-Sphera products provide opportunities for Midatech to either develop internally or license to pharmaceutical partners. The data to date is a major validation and inflection point for Midatech's Q-Sphera™ microencapsulation printing technology and establishing it as an exciting new sustained-release delivery platform, to administer pharmaceuticals safely, conveniently and effectively, without a burst phenomenon or dose dumping, and over a prolonged period. The Q-Sphera technology is now ready for adoption industry-wide, which Midatech will do via its own in house programs as well as together with partners. If you want to be part of this revolution, contact …

We look forward to unlocking the full potential of our programmes and Q-Sphera platform, both for Midatech and for our partners looking to capture a share of the multibillion dollar sustained-release treatment opportunities.