

Introduction

Systemic chemotherapy, in conjunction with radiation and surgery is the most common approach to treatment for a range of solid cancers, but is generally associated with a range of toxic, off-site side effects e.g. immunosuppression, organ damage, which in many cases can be dose limiting. Innovations are needed to enable the targeted delivery of chemotherapeutics, at adequate concentration, to the required site of action.

Interventional oncology (IO), a subspecialty of interventional radiology uses image-guided techniques to perform minimally invasive treatments in the treatment of cancer and offers a new approach to site-specific treatment of solid tumour cancers.

ChemoGel

Thermoresponsive hydrogels have attracted significant attention for drug delivery due to their ability to phase-transition from an injectable liquid at room temperatures to a solid gel at physiological temperatures. However poor clinical translatability has so far limited their application.

The **ChemoGel** project has developed a unique, thermoresponsive hydrogel drug delivery platform which enables site specific delivery and sustained release of chemotherapeutics at solid tumour sites. **ChemoGel** offers a number of specific benefits as an IO delivery platform:

Thermoresponsive

- Injectable through a range of clinically relevant needles and catheters
- Moulds to tissue shape on injection

Chemosensitising

- The hydrogel itself shows cytotoxic properties which may act synergistically with chemotherapeutic drugs

Able to incorporate multiple drug types

- Ability to target different cancer types
- Opportunity to enable site-specific delivery of newer immuno-oncologic agents

Hydrogel can be imaged using US and CT

- Strong focus on clinical translation (Figure 1)

Slow disintegration of hydrogel

- Ensures sustained exposure of tumour cells to active molecules

Application

ChemoGel is intended for use in chemical ablation of solid tumours alone or in conjunction with other treatment approaches.

ChemoGel may have potential applications in either the curative or palliative scenario. Potential clinical indications for **ChemoGel** could include solid tumours in HCC, lung, pancreatic or colon.

ChemoGel could be administered by direct intratumoural injection using US or CT imaging enabling sustained local delivery of chemotherapeutic agents. (Figure 1)



Figure 1 CT imaging (A) and Ultrasound imaging (B) of ChemoGel in *ex vivo* (bovine) tissue at 37°C.

Advantages

The damaging effects of chemotherapy on off-target tissues contributes to significant patient morbidity and can limit the dosing schedule, resulting in sub-optimal drug concentrations to combat cancer and poor clinical outcomes.

ChemoGel can facilitate sustained local intratumoural delivery of chemotherapeutics, thus assuring potent antitumoural action, while limiting the systemic exposure to toxic chemotherapeutics.

As well as improving patient outcomes, **ChemoGel** will enable maximum impact with reduced doses of chemotherapeutics, thus driving down treatment costs. This may be of particular benefit with the new generation of high cost immuno-oncology therapeutics.