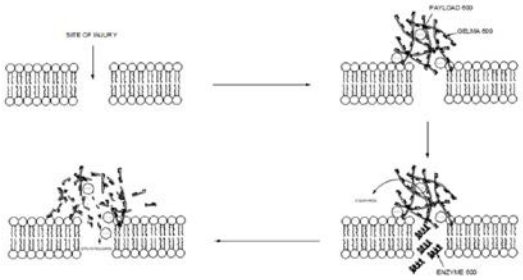
UNIVERSITY OF WATERLOO

# TECHNOLOGY SUMMARY



## Enzyme Degradable Gelatin Hydrogel for Drug Delivery in Wound Healing

## Background

Drug delivery systems, in general, help transport pharmaceutical compounds safely to the target site in the body as needed to achieve a desired therapeutic effect. The majority of drug delivery systems use a passive diffusion mechanism to slowly release their drug payload. However, such drug delivery systems are not truly controlled, as the quantity and timing of the drug release cannot be precisely controlled on demand. Gelatin-based hydrogels, such as Gelatin methacrylate (GelMA) hydrogels, are enzyme-degradable hydrogels derived from collagen. They have been studied extensively in tissue engineering applications, such as tissue scaffolding, but are not generally considered for drug delivery applications due to their poor mechanical strength and high porosity. For example, given their use as soft biocompatible gels for cell encapsulation, or as cell scaffolds, they are necessarily freely diffusive such that nutrients and large molecules can diffuse to and from the cells.

## Description of the invention

Waterloo researchers have developed a technology that provides a method of manufacturing a GelMA hydrogel having improved characteristics for tissue engineering applications (GelMA+), such as an over 8-fold increase in mechanical strength compared to regular GelMA, and favorable biodegradation kinetics both *in vitro* and *in vivo.* The novelty in this technology lies in the design of the material for drug delivery applications in wound healing. The GELMA hydrogel contains a drug, an encapsulated drug, or is attached to a drug, and the target drug is only released when the gel comes in contact with a wound site.

## Advantages

The proposed technology offers a drug delivery platform which uses a biocompatible and biodegradable hydrogel to deliver drugs in response to an enzyme-activated degradation. The amounts of drug released is directly correlated to the size and severity of the wound. For large wounds, large amounts of matrix metalloproteinases (MMPs) are released, which consequently leads to rapid gel degradation and release of large amounts of incorporated drug. In cases where there is a small wound, the gel is degraded slowly and only a small quantity of drug is released. This optimal release profile, directly correlated to the size of a wound, helps reduce localized drug toxicity, while ensuring the best optimal wound healing as needed.

## Potential applications

- Tissue engineering applications
- Corneal tissue engineering applications
- Drug delivery applications
- Wound healing applications

## Reference

10155

## Inventor(s)

Dr. Lyndon Jones
Susmita Bose
Evelyn Yim
Chau-Minh Phan
Muhammad Rizwan

## Patent status

PCT patent application # CA2020050345, filed on Mar 2020

## Stage of development

Prototype

## Contact

Scott Inwood
Director of Commercialization
Waterloo Commercialization Office
519-888-4567, ext. 33728
sinwood@uwaterloo.ca
uwaterloo.ca/research