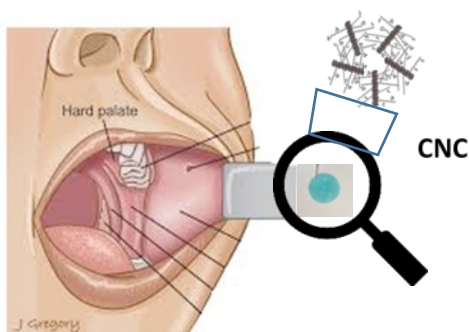


## Development of CNC Based Muco-Adhesive and Muco-retentive Nano-Gels

Faculty of Pharmacy and Pharmaceutical Sciences at the University of Alberta is developing a novel mucoadhesive and muco-retentive gel platform based on cellulose nano crystal (CNC) with applications in pharmaceutical and tissue engineering industry. In this platform technology, the nano dimension of CNC, provides high surface area for adhesion of the gel to mucosal surfaces. At the same time, the crystalline structure of CNC provides the required robustness for the gel to avoid its removal from mucosal membranes by physiological mechanical forces and/or wash off by biological fluids. This gel can stick on different mucosal membranes, including that of the mouth, eye, nose, colon and bladder, providing means for enhanced drug delivery or cell implantation.

**RECIPIENT:**

University of  
Alberta – Afsaneh  
Lavasanifar

**PARTNERS:**

InnoTech Alberta  
TEC Edmonton

**TOTAL BUDGET:**

\$298,000

**AI FUNDING:**

\$274,000

**PROJECT DATES:**

September 2018 –

March 2021

## APPLICATION

The developed gel can stick to the mucosal membranes in the mouth, resist wash off by saliva and release platinum chemotherapeutics locally, to oral cancer lesions. This approach is expected to increase drug concentration and activity at the site of the disease while avoiding systemic drug toxicity. This gel can also be applied to enhance the bio-availability of drugs destroyed by the liver when given orally. It can also provide a platform for drug or vaccine delivery through other mucosal membranes.

# ALBERTA INNOVATES CLEAN RESOURCES

## BIOINDUSTRIAL INNOVATION

### BIOMATERIALS PURSUIT

## PROJECT GOALS

- To develop a novel library of CNC based nanogels with a wide range of muco-adhesive/retentive and drug incorporation/release properties.
- To develop new processes for the fabrication CNC based gels
- To develop new equipment/tools for testing of muco-retentive properties of drug delivery systems.
- To assess the potential of developed gels for local delivery of platinum drugs in oral cancer.
- To test the ability of developed gels in wound healing.
- To present the results of our research to public and potential commercial partners.
- To protect the generated intellectual property and seek commercialization of developed materials and processes.

## BENEFITS TO ALBERTA

- This is a unique translational project that can extend the application of CNC to bio-material and pharmaceutical industries and open a new chapter in the commercialization of Alberta produced CNC.
- The project has led to the creation of intellectual property opening the door for further commercialization of the product through partnership with pharmaceutical industry or licensing to spin off companies. Either way the project contributes to the growth and diversification of the economy in Alberta.
- The project has created a new tool to provide service for pharmaceutical industries interested on the testing and development of muco-adhesive materials creating jobs in health research sector in Alberta.
- The partnership and collaboration between University of Albert, Alberta Innovates and InnoTech can facilitate the commercialization of the products and services generated through this research and help retaining the highly qualified Alberta trained personnel within the province.



**3-4 manuscripts,  
4 abstracts**



**10-100 New  
Products/Services**



**3 students  
trained**



**1 (Future) Spinoff  
Company**



**5 future patents,  
1 filed**



**2 project jobs**



**5-50 Future Jobs**

## CURRENT STATUS

### APRIL 2020

Development of CNC based hydrogels and evaluation of their adhesive/retentive properties on oral mucosal membranes of pigs is completed. The team has also evaluated the anticancer activity of cisplatin loaded hydrogels on oral cancer cells. Next goal is to develop second generation of CNC based biomaterials, capable of forming adhesive gels when exposed to ultraviolet light, and test these gels in animals.