

## Enabling a Phase I/II Multicenter Clinical Trial of a Novel Single Domain (sd)CD-22-specific Camelid-derived Chimeric Antigen Receptor (CAR) T-cell Therapy

April 1, 2020 - March 31, 2022.

### Highlights

- As part of a previously successful project, BioCanRx invested significant resources in establishing a strong network of investigators and facilities in Canada to develop clinical grade CAR T manufacturing capabilities, with a CD-19 CAR T-cell trial supported by this infrastructure currently enrolling patients (CLIC-01, NCT03765177).
- With a CAR T network in place, BioCanRx investigators in a partnership with the National Research Council of Canada have been developing a complete "antigen to clinic" pipeline, of which this CD-22 enabling study will be the first deliverable.

### Non-Hodgkin's lymphoma; Acute lymphoblastic leukemia

The overall deliverable, by the end of the funding period, is readiness to initiate a Phase I/II multi-site clinical trial for sdCD-22 CAR T-cell therapy for patients with relapsed or refractory B cell malignancies.

targeted cancers

Project value

**\$950,000**

BioCanRx contribution:  
**\$450,000**

Novel Therapeutic

**CD-22**

Partners

**2**

**BC  
CAN  
CER**

**Canada  
NRC-CRC**

### About the project

Chimeric antigen receptor (CAR) T-cell therapy targeting CD-19, a marker on B-cell cancers, is a novel approach that has induced meaningful and durable remissions for many patients and is now considered standard of care therapy in relapsed disease. This therapy is manufactured by isolating cells of the immune system called T-cells from a patient, inserting the 'CAR' gene into the t-cell using genetic techniques, growing the cells in a clinical laboratory, and then infusing back into the patient. However, despite the success of CD-19 CAR T-cells, only 40-50% of patients have a good long-term outcome.

As part of a previous BioCanRx award, the researchers developed domestic capacity for CAR T-cells as a public health effort and launched the first clinical trial of made-in-Canada CD-19 CAR T-cells. They will use this infrastructure and build on this expertise to take another CAR T-cell design, targeting a different B cell marker, CD-22, to clinical trial in order provide (a) dual CD-19 and CD-22 targeting CAR T-cells for leukemia and lymphoma patients as a way of preventing relapse, and (b) CD-22 CAR T-cells for patients with CD-19 negative leukemia and lymphoma.

NRC investigators will develop specific antigen binders for use in CAR T-cell therapy through a high throughput screening assay, and BioCanRx investigators will transfer the binder into a CAR T-cell product ready for the trial through development of clinical grade plasmids, lentivirus, and t-cell products using the BioCanRx infrastructure.

Lead candidate antigen binders for CD-22, derived from camelid single domain antibodies have already been identified by NRC and are ready for input into the BioCanRx network. Enabling the clinical grade development these single domain (sd)CD-22 binders in the BioCanRx network will: (a) demonstrate the ability of BioCanRx investigators to rapidly translate new binders into the clinic, (b) build the network to form a complete pipeline from antigen to clinic, and (c) given the emerging need for improvements to CD-19 CAR T-cells, provide a much-needed therapy for patients with B cell malignancies.

Key investigators

Dr. Robert **Holt**  
Dr. Kevin **Hay**  
Dr. Brad **Nelson**

**BC  
CAN  
CER**

## Project Team Members

### Victoria

BC Cancer  
Dr. Brad Nelson  
Dr. John Webb

### Vancouver

BC Cancer  
Dr. Kevin Hay  
Dr. Robert Holt

### Ottawa

Ottawa Hospital Research Institute  
Dr. Harry Atkins  
Dr. Natasha Kekre  
Dr. John Bell  
National Research Council of Canada  
Dr. Scott McComb  
Dr. Risini Weeratna  
Dr. Mehdi Arbabi Gharoudi

### Facility Utilization:

Biotherapeutics Manufacturing Centre (BMC),  
The Ottawa Hospital/ University of Ottawa  
The Molecular and Cellular Immunology Core (MCIC),  
BC Cancer Research Centre

### Key Milestones

### Partners

National Research Council  
of Canada (NRC) - \$200,000  
(in-kind)

BC Cancer - \$300,000

Clinical grade sdCD-22 lentivirus  
for manufacturing runs to support a  
Health Canada CTA

Optimize a sdCD-22 CAR construct for both single and dual  
transduction strategies to take forward into large scale  
lentivirus production and manufacturing runs

Two full manufacturing runs of both the  
single and dual transduced CAR T-cell  
products to support the Health Canada  
CTA

A robust clinical trial protocol and  
finalization of documents for the  
Health Canada CTA

The power to kill cancer lies within us.  
Let's tell our bodies how.

  
**BioCanRx**  
Canada's Immunotherapy Network  
Le réseau canadien d'immunothérapie

