



Bovine herpesvirus type 1 (BHV-1) replicate in and kill cancer tumor cells.

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Inventors

K. Mossman

S. Collins

B. Cuddington

M. Davola

Patent Status

Provisional patent filed

Stage of Research

In-vivo and *in-vitro* proof of principle data is available

Contact

Sunita Asrani

Business Development Manager

905-525-9140 ext. 28641

asranis@mcmaster.ca

<http://milo.mcmaster.ca>

Abstract

Oncolytic viruses are being actively studied as novel cancer therapeutics since they preferentially replicate in and kill tumor cells while also stimulating a patient-specific immune response against cancer. Some of the first oncolytic viruses tested in clinical trials were derived from the human herpes simplex virus type 1 (HSV-1) that causes cold sores. While these oncolytic viruses are safe, their delivery is limited due to pre-existing immunity within the general population.

Bovine herpesvirus type 1 (BHV-1) is a close relative of HSV-1 but specific for growth in cattle. As such, BHV-1 does not cause disease in humans and there is no pre-existing immunity against the virus within the human population. This superior safety profile suggests that BHV-1 can be administered by multiple routes.

Despite being benign in healthy human cells, McMaster researchers have found that BHV-1 infects and kills tumor cells representing different human cancer cell types, particularly KRAS-mutated tumor cells in lung and colorectal cancer that are typically resistant to chemo- and radiation therapies. Their studies in preclinical models of aggressive human breast cancer tumors show that BHV-1 controls tumor growth by killing both primary tumor cells and cancer stem cells. Combining BHV-1 with low dose chemotherapy and checkpoint blockade antibodies results in immune-mediated tumor regression.

Engineering BHV-1 has previously been difficult. McMaster researchers have developed a new protocol to efficiently generate recombinant BHV-1. This protocol has been used to generate a mutation that improves the immunogenicity of the virus. They have also developed a highly customizable cassette strategy that allows the expression of a transgene of choice, while introducing a mutation that further improves the safety profile.

A clinical use oncolytic BHV-1 effective against a broad spectrum of cancers is now being developed.

Applications

- Customizable combination therapy for various cancers

Advantages

- Superior safety profile
- No pre-existing immunity within the human population