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Commentary

# Oncolytic Virus Therapy: Destruction of Tumour Cells

**Louisa Hempel***

*Sigmund Freud University, Department of Medical, Vienna, Austria*

## DESCRIPTION

An oncolytic virus is one that infects and kills cancer cells exclusively. New infectious virus particles, or virions, are released as infected cancer cells are killed by oncolysis, to aid in the elimination of the remaining tumours. Oncolytic viruses are considered to cause not just direct tumour cell killing, but also to trigger anti-tumour immune responses in the host. Viruses anti-cancer properties were discovered in the early twentieth century, but systematic research did not begin until the 1960s.

Adenovirus, Reovirus, measles, Herpes simplex, Newcastle disease virus, and Vaccinia virus have all been clinically investigated as oncolytic agents. Although there are naturally occurring instances such as Reovirus and the Senecavirus that have resulted in clinical trials, the majority of modern oncolytic viruses are created for tumour selectivity [1]. The Enterovirus RIGVIR, a genetically unmodified ECHO-7 strain, was the first oncolytic virus to be licenced by a national regulatory agency, and it was approved in Latvia in 2004 for the treatment of cutaneous melanoma; however, the approval was withdrawn in 2019. China licenced the H101 oncolytic adenovirus, a genetically modified viral for the treatment of head and neck cancer, in 2005. Talimogene laherparepvec, an oncolytic herpes virus that is a modified Herpes simplex virus, was the first oncolytic virus to be authorised for the treatment of advanced inoperable melanoma in the United States and the European Union in 2015.

### Mechanisms of action

With advancements in cancer immunotherapy, such as immune checkpoint inhibitors, oncolytic viruses have received more interest as a way to boost antitumor immunity [2]. The interaction between oncolytic viruses and the immune system is divided into two categories. The patient's immune system, which strives to kill any virus, is a key impediment to the success of oncolytic viruses. This is a challenge for intravenous administration, because the virus must first survive interactions with the blood complement and neutralising antibodies. Chemotherapy-induced immunosuppression and complement system inhibition have been proven to improve oncolytic viral therapy. Using viruses that aren't typical human infections, preexisting immunity can be partially circumvented [3]. However, this does not prevent the production of antibodies in the future. Nonetheless, several investigations have found that pre-immunity to oncolytic viruses has little effect on efficacy.

The viral vector can alternatively be coated with a polymer like polyethylene glycol to protect it against antibodies however this hinders viral coat proteins from sticking to host cells. Hide oncolytic viruses inside macrophages are another approach to help them reach cancer growths after intravenous injection. Macrophages naturally move to sites of tissue breakdown, particularly where oxygen levels are low, which is typical of cancerous growths, and have been effectively employed to deliver oncolytic viruses to prostate cancer in animals.

## CONCLUSION

Although it creates a barrier by inactivating viruses, the patient's immune system can also be a powerful ally in the fight against tumours, infection draws the immune system's attention to the tumour, which can lead to the generation of helpful and long-lasting antitumor immunity. As a result, a personalized cancer vaccine is created. Many incidences of cancer remission have been documented spontaneously. Though the source is unknown, they are assumed to be the outcome of an unexpected immunological reaction or infection. Cancer vaccines or direct therapy with immune-stimulating substances on skin malignancies have been utilised to generate this effect. Some oncolytic viruses, particularly those that produce cytokines or other immune stimulating substances, are highly immunogenic and may activate an anti-tumor immune response when they infect the tumour.

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**Correspondence to**: Louisa Hempel, Sigmund Freud University, Department of Medical, Vienna, Austria, E-mail:louisa.hempel@123gmail.com

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