

Viruses: promising anti-oncogenic virotherapy

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Abstract

While many medical regimes are used to treat oncogenic infections, the emergence of virotherapy has drawn much interest among researchers nowadays. However, many hindrances are facing the use of them, the eminent of which is the development of tumor-resistant viral mutants. A long side with this, much knowledge on the tactics of cancerous infections coupled with better understanding of the biological properties of the viruses and viral genetics have enabled overcoming these difficulties leading to recognition of a panel of new virotherapeutic organisms. This editorial is trying to enumerate some of the oncolytic viral agents that are used in this field.

Keywords: Viruses, RNA viruses, DNA viruses, Viral mutants

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Introduction

In the long hunt for combating oncogenic diseases, the understanding, treating and controlling processes has reached significant levels. With the emergence of many therapies to treat oncogenesis, virotherapy was described. Since the first break through of 1960s, many human and animal viruses were proved experimentally to suppress *in vitro* and *in vivo* infectious and non-infectious tumor growths. Based on the replication potentiality of a given virus in cancerous cultures and its oncolytic capacity, a virus could be identified anti-cancerous. Both DNA and RNA viruses of human and animal origin are claimed to be oncolytic agents against many cancer types. DNA viruses; namely avian adenovirus¹⁻³ and herpes viruses^{1,4} are proved to be effective virotherapeutic microbes. Interesting enough, a panel of RNA viruses including orthomyxoviruses, paramyxoviruses, rabdoviruses, picornaviruses, non-human coronaviruses, reoviruses, retroviruses and many, are defined to be oncolytic agents. Newcastle disease virus⁵⁻⁷ bovine herpesvirus-1⁸⁻⁹ bovine herpesvirus-4⁹ feline leukemia virus¹⁰ non-human coronaviruses¹¹ are animal origin viruses described to combat tumorigenic cultures. Human viruses, namely measles virus¹²⁻¹³ and herpes simplex virus¹⁴ are well-known oncolytic agents used experimentally to treat tumor cases. Beside, many other viruses including Yaba-like disease virus, sendbis virus, foamy virus, and echovirus-type 1, saimiri virus are also known to be oncolytic.¹⁵

With the fact that most of the available chemotherapeutic preparations are of deleterious side effects, the vector oncolytic viruses are either used alone or synergistically with other chemotherapeutic preparations and radiating regimes. Many efforts are applied to reconstruct their biochemical composition to retain maximum therapeutic yield. The core of these modifications is directed towards combination of three traits; namely targeting, arming and shielding of the vector virus. Efficient targeting of the cancerous element usually happens via introduction of multiple layers of cancer specific elements that would further improve safety and efficiency. While arming is attainable by provision of pro-drug convertases and cytokines expression, shielding of the vector virus for protection from the host immune system is carried through coating with polymers and sequential usage of envelopes and capsids.¹⁶

However, despite much hindrances are facing the use of virotherapies as therapeutics for cancer, the eminent of which is development of tumor-resistant viral mutants, much knowledge of the

extend of cancerous infections coupled with better understanding of the biological properties of the viruses and viral genetics have enabled overcoming these difficulties. Despite the fine technology needed to attain this, many indicators of a promising future are on the horizon signaling using virotherapy in the field of oncology.

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Conflicts of interest

None.

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