Developments in Oncolytic Viruses - An Emerging Approach to Cancer Therapeutics

Description:
Oncolytic virus therapy is successful in providing an alternative treatment for cancer. Viruses have now been engineered to selectively replicate and kill cancer cells. Over the past few years, new insights into the molecular mechanisms of viral cytotoxicity have provided the scientific rationale to design more effective oncolytic viruses. Research activity is bearing fruit and a number of viruses are now in phase I/II development.

This report introduces the emerging field of oncolytic viruses and the various benefits that oncolytic virology can offer in the treatment of cancer. Clinical data suggest that oncolytic viruses may offer therapeutic advantages over existing cancer therapies such as chemotherapy and radiation and may even act synergistically with these conventional approaches. This report evaluates preclinical and clinical data on oncolytic viruses that have entered the clinic.

The resistance of cancers to conventional therapies has inspired the search for novel strategies and more in depth studies on cytolytic viruses. The selection of the optimal treatment for a cancer patient depends upon the type and location of the tumor and this is also likely to be the case with therapies based upon cytolytic viruses. The report starts with a thorough insight into the various virus and mutants which are leading to breakthrough opportunities in cancer treatments worldwide. One virus that has been investigated in detail is the herpes viruses (HSV). The report describes the development of HSVs as oncolytic viruses. One HSV based virus is MediGene’s G207. It is a double deletion HSV mutant derived from the wild-type lab strain F. MediGene are developing further HSVs including NV1020 which is now in phase II development. Equally advanced are BioVex who are also developing an oncolytic HSV, OncoVex. This virus encodes human GM-CSF facilitating tumor selective replication. Crusade Laboratories is a third company developing an oncolytic HSV, HSV1716, a virus that has been engineered to replicate only in cancer cells.

Also gaining importance in oncolytic virology is adenovirus. Adenoviruses can be harnessed to kill cancer cells as well as transfecting them with therapeutic genes thereby further improving efficacy. Adenovirus-mediated gene therapy has been proposed as a treatment alternative for advanced cancers refractory to traditional therapies. Two adenoviruses which are discussed in the report are Introgen’s INGN 007 (VRX-007) and VRX-009. Preclinical data from studies of these two oncolytic viruses show that have potential as novel cancer therapies. Cell Genesys are also developing an adenovirus platform. These products are discussed in the report and include viruses that have been engineered to include a telomerase promoter or a cytokine gene allowing tumor cell targeting. Cell Genesys’ lead virus, CG7870 is now in phase I/II development.

REOLYSIN, Oncolytics’ human reovirus represents a further virus that is being engineered for oncolytic activity. REOLYSIN is now in phase I/II development and has been demonstrated to replicate specifically in tumor cells bearing an activated Ras pathway.

The report concludes with a case study which is based on pulmonary malignant granular cell tumor (MGCT) - an uncommon, usually benign neoplasm. This study describes a patient who is presented with a MGCT of the lung and discusses the preoperative considerations and evaluation, differential diagnosis, and the pathologic features of this rare malignancy.

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Medigene
Oncolytics
BioVex

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