
Preface

Since the first report of an engineered oncolytic virus by Martuza et al. two decades ago, there has been a continuing and steady increase of interest in the field. The keyword “oncolytic virus” is associated with nearly 300 publications from Pubmed in the year of 2009 alone. Herpes simplex virus (HSV) and adenovirus (Ad) were among the first virus species to be engineered for oncolytic purposes, while the spectrum of virus species tested has since broadened to include vesicular stomatitis virus (VSV), reovirus, myxoma virus, vaccinia virus, measles virus, and Newcastle disease virus (NDV), among others. Although several of these virus species are inherently tumor-selective, others rely on attenuating or tumor-targeting modifications.

During the early days of development, the majority of the assays utilized in oncolytic virus research were, not surprisingly, those commonly used in virology research. These include assays for bulk production, replication, cytopathic effects, and *in vivo* efficacy. Over the last decade, the growth of knowledge in cancer biology, virology, and immunology, as well as advances in molecular biology, genetics, bioinformatics, and imaging technologies, have led to numerous and exciting novel discoveries, many of which have been incorporated into clinical trial designs.

The long history of oncolytic adenovirus research has led to the development of several approaches designed to improve the selectivity and potency of the virus, some of which are also applicable to other virus species. In this volume, Giménez-Alejandre et al. describe the construction and purification of capsid-modified adenoviruses, and Doronin and Shayakhmetov describe the construction of armed oncolytic adenoviruses. Protocols for many individual virus species are covered, including engineering and preparation of oncolytic HSV by Agarwalla and Aghi, propagation, purification, and *in vivo* testing of oncolytic VSV by Diallo et al., and Msaouel et al. on retargeting oncolytic measles virus through ligand display. Properties of oncolytic reovirus and NDV are covered by Shmulevitz et al. and Fournier et al., respectively. Thorne describes the generation and testing of next generation of oncolytic vaccinia virus. As the host immune system plays a critical role in determining efficacy of oncolytic viruses, we devote two chapters in the study of immune response. *In vitro* study of innate immune signaling and its impact on oncolytic virus is described by Heiber and Barber, whereas Dhar et al. describe the use of Syrian Hamster as an immunocompetent model for oncolytic adenovirus. Two imaging modalities are introduced in this volume: application of luciferase-expressing virus by Barry et al., and *in vivo* positron emission tomography (PET) imaging with the sodium iodide symporter as a reporter gene is described by Tran et al. Recent advances in stem cell research have led the field in two distinct directions: the use of stem cells as carrier vehicles for oncolytic viruses, and the targeting of cancer stem cells. The former is described by Ahmed et al. while the later is covered by Alonso et al. Finally, the use of explant tissue samples from patients may provide useful information in predicting responses prior to clinical translation; this is covered in detail by Hallden.

Ultimately, the success of this field depends on breakthroughs in clinical studies. However, bench research remains vital for the translation of research in this field. We hope the assays covered in this volume will assist you in your research.

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