



Minireview

Synthetic immunostimulatory oligonucleotides in experimental and clinical practice

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Abstract:

Background: Oligonucleotides belong to a class of macromolecules with great potential for research and various therapeutic applications. Their mechanisms of action are extremely diverse, although they are rather homogeneous in composition. Single-stranded oligodeoxynucleotides are not only inhibitors of gene expression, but their CpG sequence motifs may activate the innate immune response. Recent progress made in preclinical and clinical testing, as well as the case of the most recently discovered RNA interference technology, will help to overcome efficacy problems of the previous approaches of the 'standard therapy' of such diseases as tumors and various infections.

Methods: The aim of this article is to present various therapeutic aspects of oligonucleotides, and to review the most significant therapeutic applications of synthetic oligonucleotides. This paper presents a comprehensive review of current literature on various therapeutic properties of synthetic oligonucleotides.

Conclusions: The available results gathered from preclinical and clinical studies suggest that TLR9-targeted therapy of oligonucleotides can stimulate both innate and adaptive immunity. It also appears that CpG ODNs are generally safe, although moderate adverse effects, based on a backbone-related mechanism have been reported. The presented studies demonstrate that adjuvant CpG ODN can unify an immune response that leads to enhanced antigen-specific Ab formation. CpG ODN may therefore provide a unique approach to enhancing the efficacy of immunization, including the strengthening of antitumor immunity.

Key words:

immunostimulatory oligonucleotides, short interfering RNA, toll-like receptors, cytotoxic T-lymphocyte antigen 4, regulatory T cells
