

NOVEL SELF-ASSEMBLED RNA ORIGAMI NANOSTRUCTURES FOR ANTI-CANCER IMMUNOTHERAPY

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Nucleic acid sensing is an essential mechanism of the innate immunity. DNAs and RNAs, released from microorganisms or damaged cells, are perceived as danger signals and recognized by a diverse set of cellular receptors, known as pattern recognition receptors (PRRs). An engagement of PRRs with their ligands triggers a potent activation of the host defense signaling pathway, leading to rapid production of pro-inflammatory cytokines. Thus, DNA and RNA have been explored for the development of vaccines against cancer and infectious diseases. Recently, we have created a novel self-assembled RNA-origami nanostructure that functions as Toll-like Receptor 3 (TLR3) ligands. Injections of this RNA structure into tumor-bearing mice resulted in a significant delay or even regression of the tumor growth and yet caused no apparent adversity to the animals. Moreover, this RNA nanostructure is highly stable and readily manufactured for a large quantity. Given their well-defined structure and configuration, as well as programmable nature, RNA-origami nanostructures represent a new line of vaccine platforms for rational design and construction of effective, safe and affordable immunotherapeutics.

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