Washington University in St. Louis
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CHIMERIC ARTIFICIAL INTERFERENCE RNA (AIRNA) FOR RNAI-BASED CANCER THERAPY

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Technology Description

In search of more effective cancer treatments, inventors in Dr. Xiaowei Wang's lab at Washington University School of Medicine have developed artificial interference RNA (aiRNA). aiRNA is a patented chimeric RNAi that combines the multi-target abilities of miRNAs and the robust regulation effects of siRNAs for a potentially more effective and nontoxic therapy. The molecule is created by combining a miRNA seed sequence with an siRNA sequence to target multiple cellular functions. The siRNA component provides robust disease-related gene regulation. The miRNA component allows the aiRNA to target multiple cellular pathways, giving it an additional method to target disease-related genes. aiRNAs are simple to modify and provide a promising future for cancer and other RNAi-based therapeutics.

Stage of Research

- **In vitro** study (figure below) of aiRNA with miR-200a (to suppress cell motility) and AKT1-targeting siRNA (to suppress cell proliferation) functions suppress cancer cell motility (A) and proliferation (B) better than the miRNA or siRNA alone in HeLa cells.

- **Proof of concept** aiRNA with miR-9 (to promote cell motility) and TP53 siRNA (to prevent cell death) functions resists chemotherapy and promotes cancer cell motility in HeLa cells.

Applications

- **Cancer** and other RNAi-based therapies

Key Advantages

- **Improved efficacy and specificity** – molecule is designed to have less off-target effects than siRNA and more robust effects than miRNA alone
- **Simple design and delivery**
  - Modular miRNA and siRNA components can be customized to target other disease-related genes
  - Single aiRNA molecule may be easier to package into therapeutics than separate miRNA/siRNA molecules
- **Multi-faceted robust therapy**
  - miRNA component targets multiple genes in the disease pathway and mitigates off-target effects of siRNAs

- siRNA component complements miRNA component to regulate additional disease-related pathways

Publications

Jiang Z, Liu W, Wang Y, Gao Z, Gao G, Wang X. Rational design of microRNA-siRNA chimeras for multifunctional target suppression. *RNA*. 2013;19(12):1745–1754.

Patents

Rational design of microRNA-siRNA chimeras for multi-functional target suppression (U.S. Patent Nos. 9,550,989)

Website

- Wang Lab Website
- Xiaowei Wang Profile