Targeted miRNA Approach to Pediatric Diffuse Midline Glioma

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ABSTRACT

Researchers at the University of California, Davis have developed a treatment method leveraging let-7 microRNA restoration to combat aggressive pediatric diffuse midline gliomas with H3K27M mutations.

FULL DESCRIPTION

This technology involves a novel therapeutic strategy targeting pediatric diffuse midline gliomas harboring the H3 K27M mutation, a form of aggressive brain tumor with poor prognosis. Utilizing miRNA sequencing, it was found that the tumor suppressor let-7 family of microRNAs is significantly downregulated in these mutant glioma cells compared to wild-type. The method delivers synthetic let-7 miRNA molecules, stabilized oligonucleotides, or gene vectors encoding let-7 precursors directly to tumor cells to restore their expression, thereby repressing oncogene activity, inhibiting tumor growth, and improving patient outcomes. Delivery systems include lipid nanoparticles, viral vectors, and polymer-based carriers designed for targeted, controlled administration. The approach also explores modulation of LIN28, a protein that blocks let-7 maturation, as an adjunct therapeutic intervention.

APPLICATIONS

- Therapeutic development for pediatric diffuse midline gliomas and other H3K27M mutant gliomas.
- RNA-based therapies targeting oncogenic pathways in brain tumors.
- Precision medicine approaches in pediatric neuro-oncology.
- Development of delivery platforms for microRNA therapeutics in CNS cancers.
- Potential expansion into treatments for other cancers with let-7 microRNA dysregulation.

FEATURES/BENEFITS

- Restores tumor-suppressor let 7 microRNAs reduced by the H3K27M mutation.
- Inhibits core oncogenic programs that control tumor-cell growth and differentiation.
- Enables precise spatial and temporal control by leveraging versatile delivery modalities.
- Amplifies therapeutic impact by combining multiple let 7 family members and/or complementary regulatory RNAs.
- Provides a potential systemic treatment option beyond radiation.
- Addresses the lack of effective systemic therapies for aggressive pediatric diffuse midline gliomas with H3K27M mutation.
- Counteracts mutation-driven suppression of let 7 tumor-suppressor microRNAs that drives uncontrolled proliferation.
- Targets underlying genetic and epigenetic disease drivers that current options do not directly treat.

PATENT STATUS

Patent Pending

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Calcium Signaling as a Target for Medulloblastoma

INVENTORS

- Kelly, Cailin
- Knoepfler, Paul

OTHER INFORMATION

KEYWORDS

brain tumor, diffuse midline glioma, h3 k27m, let-7 microRNA, lin28, miRNA therapy, pediatric cancer, RNA delivery, tumor suppressor, viral vectors

CATEGORIZED AS

- **Biotechnology**
  - Genomics
  - Health

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