

New biotechnology to inhibit microRNA activity and novel applications

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Today at the 45th Annual Meeting & Exhibition of the American Association for Dental Research, researcher Brad Amendt, University of Iowa, Iowa City, USA, will present a study titled "New Biotechnology to Inhibit MicroRNA Activity and Novel Applications for Craniofacial and Dental Research." The AADR Annual Meeting is being held in conjunction with the 40th Annual Meeting of the Canadian Association for Dental Research.

A new plasmid-based microRNA inhibitor system (PMIS) effectively inhibits microRNA (miR) activity in cells and mice. In this study, researchers generated a novel RNA-based hairpin molecule carrying an anti-sense miR seed sequence that effectively knocks down endogenous miRs and mitigates their effects on messenger RNA in the cell. By using a native RNA-based molecule for miR knockdown, the PMIS platform avoids many of the traditional pitfalls associated with miR inhibition using synthetic oligonucleotides.

The PMIS approach is more specific and stable, effective at a lower dose, more cost-effective and more importantly it is not toxic to living tissues, in contrast with many traditional miR inhibition strategies. The researchers generated miR knockdown mice that show defects in craniofacial and tooth development. Mice with the PMIS in the Rosa26 loci are activated with specific Cre lines or can be constitutively expressed during development. miR inhibition in mice reveals a role for miRs in many developmental pathways and cellular processes. When combined with a bioinformatics approach the PMIS can determine new

miR targets and biological processes. The PMIS can be delivered using viral vectors, nanoparticles and lipid-based systems to effectively knockdown miR activity. The PMIS was used to reprogram cells, define new developmental processes and inhibit cancer cell growth.

At the conclusion of the study, the researchers found that the PMIS is a new tool that is highly effective for inhibiting miR activity in vivo and in vitro. Importantly, the non-toxic nature of the PMIS molecule makes it promising platform for the delivery of miR inhibiting effects that could have potential as a treatment of human diseases and genetic defects, something that has proven difficult for traditional oligonucleotide approaches to miR inhibition.

More information: This is a summary of oral presentation #0886, "New Biotechnology to Inhibit MicroRNA Activity and Novel Applications for Craniofacial and Dental Research," which will be presented on Friday, March 18, 2016, 8 a.m. - 8:45 a.m. at the Los Angeles Convention Center, room 406A.

Provided by International & American Associations for Dental Research

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