Formulation Of HDACi Loaded ß-Cyclodextrin-Poly (ß-Amino Ester) Nanoparticles

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Researchers have developed a novel formulation strategy to encapsulate molecules, including but not limited to histone deacetylase inhibitor (HDACi) drugs in nanoparticle networks composed of beta-cyclodextrin-poly(beta-amino esters). Advantages of this system include high loading capacity, increased in vivo tolerability, sustained release, and improved drug distribution and activity in the treatment of solid tumors.

Technology Overview

A beta-cyclodextrin-based, cross-linked polymer is employed in the formulation as a novel excipient instead of conventional diblock copolymers like PLGA and PLA-PEG. This pre-synthesized polymeric network forms particles in aqueous medium that are in the range of 100-500nm with defined polydispersity. Simply doping the drug at a desired concentration, followed by mechanical agitation, leads to the formulation of drug bound nanoparticles through self-assembly. The particles can then be retrieved and concentrated with subsequent lyophilization.

Benefits/Technology Advantages

- Simpler loading strategy compared to previously studied techniques that does not require physical manipulation to optimize (i.e. no temperature or pH changes needed)
- Higher drug loading capability per nanoparticle (8 wt% or more in terms of drug to excipient ratio)
- Novel mechanisms of drug loading and release are a particular benefit to drugs with ionizable moieties
- Unique surface chemistry improves modularity of the system for further engineering, including attachment of surface targeting ligands or imaging agents

Potential Applications

Sustained drug release

Oncology, Neuro-oncology, Trauma, Inflammation, Neuro-Immunology, Neurodegeneration, HIV/AIDs, Cardioprotection

Intellectual Property Status

U.S. Provisional patent application filed

Available for licensing.

Stage of Development

Early, pre-clinical

About the Inventor

Rachael Sirianni, Ph.D., joined the Department of Neurosurgery at UTHealth in 2018 from the Barrow Neurological Institute. Her research program is focused on engineering drug loaded nanoparticles for intrathecal and intraventricular drug delivery in Pediatric Neuro-Oncology. Dr. Sirianni earned her doctorate in Biomedical Engineering at Yale University and completed a postdoctoral fellowship in Diagnostic Radiology at the Yale School of Medicine.

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