
# pH-Responsive Nanoparticle For Delivery Of Ribonucleoproteins

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## The Invention

UW researchers have developed a polymeric nanoparticle to package and deliver a CRISPR/Cas protein/guide RNA complex and, optionally, a single stranded DNA repair template into cells for gene therapy. The self-assembled nanoparticle uses a di-block copolymer functionalized to provide an amphiphilic molecule when in a neutral or slightly basic pH. The amphiphilic nature of the nanoparticle interacts with the various charges on the ribonucleic acid-protein complex to form the loaded particle. Once inside the cell, the acidic nature of the endosomes leads to protonation of the nanoparticle which causes the particle to disintegrate releasing the ribonucleoprotein complex into the cytosol of the cell where it traffics to the nucleus to edit the target gene. The nanoparticle can be functionalized with cell targeting molecules to ensure delivery of the payload to the correct cells. The pH sensitive poly(ethylene glycol)-b-poly(2-(azepan-1-yl)ethyl methacrylate) (PEG-PC7A) di-block copolymer can form well-defined nanoparticles (NPs) with either Cas9 or Cas12a RNP to achieve gene knock down, or with Cas9 RNP plus ssODN to achieve genome editing. The loading capacity for this nanoparticle is very high, the size of the loaded particle is very small, and the inventors have confirmed the editing capabilities of the complex using cell culture and an animal model for Duchenne muscular dystrophy. Upon treatment with the particle containing the CRISPR-Cas complex and the single stranded DNA repair template, the treated mice showed improved strength in their limbs and dystrophin was found in all treated muscles.

## Additional Information

**For More Information About the Inventors**

- Shaoqin Gong

**Tech Fields**

- Drug Delivery : Biologics

For current licensing status, please contact Rafael Diaz at rdiaz@warf.org or 608-960-9847