

# DNA Origami Nanostructures as Precision Delivery Vehicles for CRISPR Ribonucleoproteins in Duchenne Muscular Dystrophy

Dr. Kevin Park<sup>1\*</sup>

<sup>1</sup>Molecular Therapy Center, Seoul National University, Seoul, South Korea

\*Corresponding Author: [kevinpark@snu.ac.kr](mailto:kevinpark@snu.ac.kr)



## Abstract

In vivo delivery of CRISPR-Cas9 for Duchenne muscular dystrophy (DMD) requires muscle-specific targeting and reduced immunogenicity. We designed tubular DNA origami nanostructures (DONs) functionalized with myostatin-derived peptides for sarcolemmal targeting. These DONs encapsulated Cas9-guide RNA ribonucleoproteins (RNPs) targeting the *DMD* exon 51 splice site. Intramuscular injection in *mdx* mice achieved 35% exon skipping in myofibers, restored dystrophin expression, and improved grip strength by 45%. Unlike viral vectors, DONs elicited minimal innate immune responses and were cleared within 72 hours. This programmable, non-viral delivery system advances gene editing therapies for monogenic muscle diseases.

**Keywords:** DNA origami, CRISPR-Cas9 delivery, Duchenne muscular dystrophy, ribonucleoproteins, non-viral vectors, exon skipping



This work is licensed under a Creative Commons Attribution Non-Commercial 4.0 International License.