AAV Functionalization via Non-native Surface Exposure of Cysteine Residue through Site-Directed Mutagenesis

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Adeno-associated virus (AAV) possesses superior characteristics such as lack of pathogenecity and non-integrating genome while demonstrating considerable transduction efficiency compared to its viral vector peers. However, it is undeniable that AAV also has its flaws and research are being done worldwide in order to fully optimize the potential of AAV as a gene delivery vehicle. Herein, we focus on modification of an AAV's capsid in hopes that obstacles such as low specificity in tropism as well as co-delivery of different AAVs can be enhanced. To this end, we attempted to introduce onto AAV's capsid surface cysteine residues that can be utilized as tethers for further biomolecular hybridization such as oligonucleotide and other protein sequence. We demonstrated that these cysteine-exposed mutant AAVs (^{Cys}AAV) experienced changes in their transduction efficiencies depending on the site of residue modified. We also tried to prove that the tethering of molecules onto these cysteine residues is plausible.

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