CRISPR-Cas9 Guided RNA Based Model for the Silencing of Spinal Bulbar Muscular Atrophy: A Functional Genetic Disorder

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Abstract

Spinal bulbar muscular atrophy (SBMA) is a neurodegenerative genetic disorder, which results because of a mutation in the start codon of the Androgen Receptor (AR) gene. The mutant Androgen Receptor gene features the polyglutamine expansion (CAG) repeats, undergoing inappropriate post-translational modifications, which leads to development of toxin production functionality. In order to inhibit the production of mutant AR gene, CRISPR-Cas9 based model to cure the trinucleotide repeat disorder is proposed in this research. CRISPR cas9 constructed guided RNAs are expected to showed max treatment accuracy an effective silencing method in the functional genetic disorder of SBMA. It demonstrates the on-target and off-target scores that hold GC content within 40 - 60%. Further validation comes from the minimum free energy that is correlated with the gRNA's structural accuracy. Although, currently, there is no effective and complete cure of SBMA is available except symptomatic treatments, CRISPR-Cas9 provides a better approach to target this disease at the molecular level, which gives a hope to develop an effective treatment against this currently non-curable disease. Possible results are constructed using in-silico and computational therapeutic approach for SBMA. The CRISPR-Cas9 protein shows promising results in an artificial environment. Thus, this study presents for the first time a specific possible future candidate in the treatment of SBMA that holds potential as a therapeutic approach for a genetic disorder. Imbued by the CRISPR mechanism and the suitability of gRNA, this strategy can be utilized as a novel therapeutic approach.

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