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A REVIEW ON GENETIC DISORDER SUPPRESSOR

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ABSTRACT

Due to recent developments in genetics and genomics, genetic disease suppressors have been discovered, providing new therapeutic approaches for genetic disorders, which are caused by mutations in DNA and constitute a substantial global health burden. This article explores genetic disorder suppressor kinds, mechanisms, and examples, emphasizing their ability to reduce or eliminate the severity of disease. We talk about suppressor genes, RNA-based suppressors, and gene editing technologies, highlighting the difficulties and potential paths forward.

OVERVIEW

The discovery of the CRISPR/Cas 9 system has revolutionized genetics and created previously unheard-of possibilities for accurate genome alteration. this adaptive immune system of bacteria. Researchers can target precise DNA accuracy through the repurposing of materials for gene editing. Adaptive immunity against viral and plasmid DNA is provided by the CRISPR-cas systems seen in bacteria and archaea. There are two primary parts to these systems. a little RNA that targets DNA (CrRNA).

A new knowledge of gene regulation and a field for investigating RNA-based mechanisms in different animals were made possible by the discovery of RNAs. Since then, RNA technology has emerged as a useful resource in the fields of biotechnology, function genomics, and pharmaceutical research. One of the most effective tools for comprehending gene function and creating therapeutic therapies is the capacity to precisely inhabit the expression of a single gene. Gene function in Caenorhabditis elegans has been widely studied using genetic mutations and the animal. (3). Therefore, gene therapy seeks to close the gap between the pathophysiology of disease and effective treatment that targets the root causes of illness. This innovative substitute for traditional small-chemical pharmacology gains benefit from the application of gene therapy to alleviate symptoms.

Suppressor of Genetic Disorders

Some of the most effective instruments for examining gene expression, function, and interaction are gene suppressors. Genetic disorders are illnesses brought on by anomalies in a person's DNA. Numerous health issues may result from these anomalies. modest to severe in severity. Genes or genetic components that can lessen or completely eradicate the consequences of genetic illnesses are known as genetic disorder suppressors. In addition to its potential to heal genetic diseases, the CRISPR/Cas 9 system has broad implications for basic science, biotechnology, and medicine. Boost agricultural output and create new biological pathways. Repurposing CRISPR-Cas systems for genome editing in eukaryotic cells has been demonstrated by recent research.

Therefore, we examine what is currently known about the CRISPR-Cas system, emphasizing its structural and functional link.For this discovery, Andrew Fire and Craig Mello were granted the 2006 Nobel Prize in Physiology or Medicine. Nonetheless, these methods have made it easier to analyze how genes work.

The most often utilized systems are CRISPR/Cas9 and Type 2, whereas CRISPR/Caf1 is an alternate method with a different PAM requirement.

Type 2 CRISPR/Cas:

1.One gRNA design
2. gRNA-Cas complex structure
3. Recognition of the target site
4 Cleavage of DNA
5 Activation of repair machinery

One gRNA designgRNA is made to target particular DNA sequences.
Two gRNA-Complex formulation of cas 9:gRNA attaches itself to the Cas9 enzyme.
3. The intended location Appreciation:Complementary DNA sequences are bound by guide RNA (gRNA).
4 Cleavage of DNA:The Cas 9 enzyme causes a double-strand break in DNA by cutting it at the target location.
5 Fix:Edits are introduced by the cell's repair mechanism through homologous recombination (HR) or non-homologous end joining (NHE).

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• Use

The following are the challenges and limitations:
1 Gene Knockout/Knockdown;
2 Gene Replacement/Editing;
3 Gene Regulation; And
4 Genome Engineering
2 Mosaicism 1 Off-Farget Effect
Three Ways Of Distribution
4 Efficiency & Specificity
CRISPR/Caf1:A protein complex called CAF1 (Chromatin Assembly Factor 1) is involved in DNA replication and chromatin assembly. It is essential for controlling gene expression and preserving genomic stability.

Numerous cellular functions have been linked to CAF1, including:

1. Chromatin assembly: CAF1 deposits histones onto freshly duplicated DNA to aid in chromatin assembly.
2. DNA replication: CAF1 plays a role in maintaining the stability of the genome and controlling DNA replication.
3. Gene regulation: By controlling chromatin accessibility and structure, CAF1 can affect how genes are expressed.

The Process of Modifying Genes

1. Target recognition: Grna binds to DNA sequences that are complimentary.
2. DNA cleavage: The Cas9 enzyme snips DNA at the desired location.
3. Repair: changes are introduced by the cell's repair machinery

LITERATURE REVIEW

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7. Musunuru (2019) Conclusion: Beta-thalassemia and sickle cell disease gene editing shows promise.
8. Mali et al. (2013) Conclusion: Effective editing is made possible by RNA-guided human genome engineering using Cas
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Aim

To investigate and comprehend the potential of several therapeutic modalities, such as gene editing, RNA-based treatments, and small molecule therapies, in preventing or curing genetic illnesses, and to talk about the state of research, obstacles, and potential future directions in this area.
The goal is
1. To examine the state of knowledge on genetic illnesses and the molecular mechanisms behind them.
2. To talk about the fundamentals and uses of gene editing technologies (like CRISPR/Cas9)
3. to investigate the function of RNA-based treatments (such as antisense oligonucleotides and RNA interference).
4. To look into how tiny molecule therapeutics could be able to suppress hereditary disorders.
5. To draw attention to the shortcomings and difficulties of the existing methods.
6. to determine prospective therapy approaches and future research avenues.

RESULTS

One promising treatment and management option for genetic disorders is the use of genetic disease suppressors. developments in gene editing. Small molecule and RNA-based treatments have demonstrated great promise in preventing or eradicating genetic mutation. Even while there are still obstacles to overcome, continued research and clinical trials are moving us closer to a successful cure.

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