

Editorial**Challenges with Newly Approved CRISPR Gene Technologies****Sagheer Ahmed**

Shifa College of Pharmaceutical Sciences, Shifa Tameer-e-Millat University Islamabad, Pakistan.

*Correspondence: sagheer.scps@stmu.edu.pk

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CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats) technology is a powerful gene-editing tool that allows for precise modification of DNA. While CRISPR has shown immense potential in laboratory and preclinical studies, the development of CRISPR-based therapies for human use is still in the early stages. However, on December 08, the Food and Drug Administration (FDA) of the United States of America approved two milestone treatments, Casgevy and Lyfgenia, representing the first cell-based gene therapies for the treatment of sickle cell disease (SCD) in patients 12 years and older. Several CRISPR-Cas9 therapies that work on the same principle are in clinical trials as treatments for a range of diseases.

However, there are still significant concerns with the use of this new technology. One major concern with CRISPR technology is the potential for off-target effects, where unintended changes may occur in locations other than the target gene. The introduction of CRISPR components into the body may also trigger an immune response. Several laboratories are investigating ways to mitigate immune reactions and improve the delivery of CRISPR components. The method of delivering CRISPR components into cells is also important for safety. Further research into different delivery methods, such as

viral vectors or nanoparticles, would help optimize efficiency while minimizing potential side effects.

The long-term effects of CRISPR-based interventions are an area of ongoing research. Understanding the stability of CRISPR-induced changes over time and potential consequences is crucial for assessing safety. Ethical considerations are important to discussions about CRISPR use, particularly when it comes to editing the human germline (sperm, eggs, embryos), as changes made in these cells would be heritable. The potential for unintended consequences and ethical implications necessitates careful consideration.

It is important to consider that although CRISPR holds great promise, the technology is relatively young, and research is ongoing to address safety concerns. The scientific community and regulatory bodies are actively working to ensure that CRISPR technologies are developed and implemented responsibly. Continuous advancements, ongoing research, and open communication will be essential to addressing safety challenges associated with CRISPR.

Professor Dr. Sagheer Ahmed*Editor –In-Chief***Molecular Medicine Communications**