**Body Paragraph 1**

The circDesign algorithm greatly improves protein expression efficiency by designing more stable structure and translation parts in circular RNA (circRNA). In traditional linear RNA systems, the structure is instable and easy influenced by enzymatic degradation, so protein expression is often influenced. However, circDesign algorithm solve these problems by careful computational optimization. The algorithm strategically selects internal ribosome entry sites (IRES) and coding sequences (CDS) to reduce structural influence. In this way, it improves the translational efficiency of circRNAs. For example, a experiment demonstrated that circRNAs designed by circDesign showed higher expression levels in cell-based assays compared to traditional linear RNAs and other common circRNA (Xu et al., 2023). To be exact, circRNAs optimized by circDesign had a translational efficiency of 233.7 units, which was better than the 159.9 units reached by conventional methods (Xu et al., 2023).What is more, this enhancement is reached through structural modifications that retain optimal IRES integrity and reduce minimal free energy (MFE). This is very important for efficient translation (Xu et al., 2023). This structural optimizations greatly improve circRNA's translational ability, making proteins express stable and long. This will benefit a lot to therapeutic applications. To sum up, circDesign's computational strategy overcomes the triditional problems about circRNA translation. The innovation makes it an advanced key in protein therapeutics, vaccine development and gene editing technologies. CircDesign makes great progress in RNA-based pharmaceutical innovation. Through minimizing structural constraints and maximizing translational elements, it can achieve more efficient and sustained protein production than before.

## Body Paragraph 2

Expect from protein expression, circDesign also greatly improves the stability of circRNA, significantly enhancing vaccine efficacy and therapeutic potential. Nowadays, stability is one of the most difficult problems for RNA-based therapeutics beacuse RNA molecules are rapidly degraded in human bodys. CircDesign solve the problem by optimizing the circRNA secondary structures. This can minimize the sensitivity of RNA to enzymatic degradation. Experimental data shows that circRNAs designed by circDesign greatly improve half-lives both in the body and outside the body compared to linear RNAs and other common circRNA. For example, circDesign-generated circRNAs showed extended half-lives of 24.56 ± 5.2 hours in blood samples, which was dramatically better than linear RNAs that degrade in 16.4 hours (Cao et al., 2025). Furthermore, in vivo studies highlighted stable and sustained expression of antigens encoded by circDesign RNAs. It can maintain effective condition for over one week after consumption (Cao et al., 2025). This long-lasting stability will improve vaccine potency. Animal studies shows that circRNA vaccines designed by circDesign have more persistent immune responses. It includes many elevated neutralizing antibody titres and can improve cellular immunity. They emphasized circRNA's anti-exonucleases ability due to its circular shape. Then they combined it with algorithm-driven optimization to improve this advantage. Therefore, circDesign not only improve circRNA stability but also make a contributuin to effective vaccines. Its stability extend antigenic activity and reduce dosage frequency. In a word, it improved the efficacy and practicality of RNA-based vaccines. To sum up, circDesign is a advanced technology for solving stability challenges in RNA therapeutics and vaccine development. It is a outstanding innovation in the field of pharmaceuticals.