Effective Prevention of Fatal Liver Injury in Tyrosinemia Type 1 Mice Using Modified E. coli Nissle Strain

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Abstract

This study investigates the e f cacy of a genetically modifed Escherichia coli Nissle strain in mitigating liver injury

In this research, we engineered a specialized E. coli Nissle strain capable of metabolizing excess tyrosine and its toxic intermediates. Mice a f icted with tyrosinemia type 1 were administered this modifed bacterial strain orally, and their liver function and histopathology were assessed. Results demonstrate a signifcant reduction in liver injury markers and histological evidence of liver damage in mice treated with the modifed E. coli Nissle strain compared to untreated corea ea e w¾ t uc ɳ ʌ ɕ ʊ ز Σ 0 l ʌ ä ! ɕ l † ' m M ɔ l ʊ ɹ

K ord : Tyrosinemia; E. coli Nissle; Liver injury; Mouse model; Prevention; Metabolic disorder

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elucidate the underlying mechanisms of bacterial-mediated protection against liver injury and to evaluate the long-term safety and efficacy of this therapeutic strategy in clinical settings.

Conclusion

In conclusion, our study highlights the efficacy of a genetically modified Escherichia coli Nissle strain as a promising therapeutic intervention for tyrosinemia type 1. By engineering the bacterial strain to target the metabolic pathway of tyrosine and its toxic intermediates, we were able to prevent liver injury and improve liver function in a mouse model of the disease. These findings underscore the potential of microbial-based therapies in managing metabolic disorders characterized by dysregulated tyrosine metabolism.

The use of engineered bacterial strains offers several advantages, including targeted delivery of therapeutic enzymes, modulation of host metabolism, and the potential for long-term colonization of the gut. Moreover, microbial-based therapies may provide a safer and more sustainable alternative to conventional treatments, such as dietary restrictions and drug therapy. However, further research is needed to optimize the design of bacterial strains, elucidate the mechanisms underlying their therapeutic effects, and evaluate their long-term safety and efficacy in preclinical and clinical studies. Additionally, the development of strategies to enhance bacterial colonization and persistence in the gut, as well as the identification of biomarkers for monitoring treatment response, will be crucial for the successful translation of microbial-based therapies into clinical practice. Overall, our findings support the growing interest in the use of engineered bacterial strains as innovative therapeutics for metabolic disorders and pave the way for future research aimed at harnessing the potential of the gut microbiota in promoting health and preventing disease.

Acknowledgement

None

Conflict of Interest

None

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