Spatial Insights into hTERT Promoter Restoration as a Novel Pathway for Cancer Drug Discovery

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BACKGROUND

For decades, scientists have searched for ways not just to slow the rate of cancer growth but to eliminate it source. A key clue lies in mutations within the promoter region of the human telomerase reverse transcriptase (hTERT) gene — especially the C228T mutation. These changes trigger abnormal telomerase activation, allowing cancer cells to multiply constantly and resist cell death. While today's treatments aim to slow tumor growth, few target this underlying cause.

OBJECTIVE

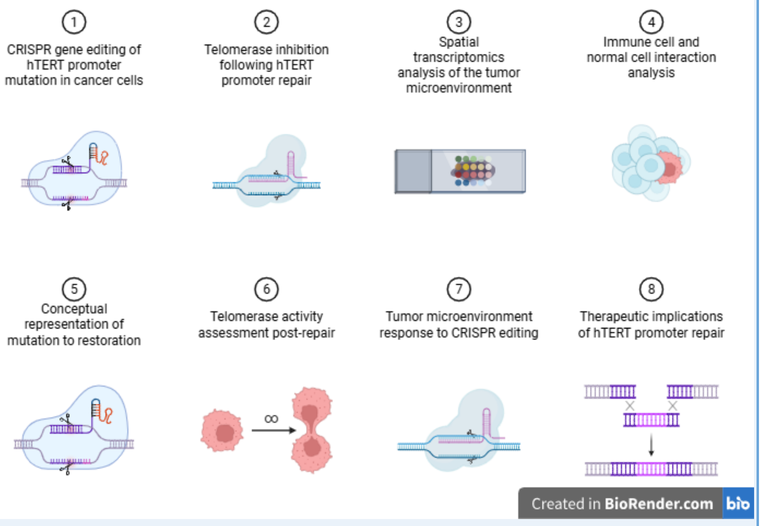
We propose a forward-looking combined strategy that directly addresses the hTERT promoter mutation — aiming not just to treat but to heal with long-lasting results — while integrating spatial technologies to reveal how these mutations are distributed within the tumor microenvironment.

METHODS

This multi-step approach is designed with both care and precision.

- First, reduce abnormal tumor cell division using temporary regulatory agents.
- Then, apply gene-editing tools to repair the hTERT promoter mutation — restoring proper cellular control.
- At the same time, enhance immune surveillance through cytokine support and checkpoint inhibitors.
- Incorporate spatial transcriptomics and multiplex imaging to map hTERT promoter mutation patterns across tumor niches, thereby tailoring interventions to microenvironmental heterogeneity.

- Supportive therapies are included to protect the digestive, neurological, and cardiovascular systems during treatment, ensuring overall patient well-being



THEORETICAL INSIGHTS

This approach moves beyond traditional cancer suppression toward true molecular restoration.By repairing the hTERT promoter (C228T mutation) through CRISPR-based editing, normal telomerase regulation can be reestablished, preventing uncontrolled proliferation.Through spatial transcriptomics, the heterogeneous distribution of these mutations within the tumor microenvironment can be visualized, guiding more precise and personalized therapy.Integrating gene correction, immune support, and microenvironmental mapping builds a foundation for long-term remission — restoring cellular harmony instead of destruction.

Conclusion

This strategy offers more than suppression — it seeks restoration. By correcting the mutation at its source, while also mapping and targeting its spatial distribution within the tumor ecosystem, it represents a scientifically grounded and personalized path toward durable remission of aggressive tumors.

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