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# TERT promoter mutations in gliomas: Molecular roles in tumorigenesis, metastasis, diagnosis, prognosis, therapeutic targeting, and drug resistance

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## Abstract

Telomerase reverse transcriptase (TERT), a critical player in cellular immortalization, has emerged as a focal point of investigation due to its frequent promoter mutations in various human malignancies. TERT promoter mutations exhibit a significant role in tumorigenesis, fostering unbridled cellular proliferation and survival. This comprehensive review delves into the landscape of TERT promoter mutations and their profound implications in cancer, particularly within the context of gliomas. This article meticulously examines the intricate interplay between TERT promoter mutations and the metastatic cascade, shedding light on their capacity to orchestrate invasive behavior in gliomas. Moreover, this review describes the recent trends in therapeutic targeting of the TERT and dissects the evolving landscape of drug resistance associated with TERT mutations, providing insights into potential therapeutic challenges. In addition, the diagnostic and prognostic implications of TERT promoter mutations in gliomas are scrutinized, unraveling their potential as robust biomarkers. It also discusses the recent advancements in molecular diagnostics, illustrating the promise of TERT mutations as diagnostic tools and prognostic indicators. This review collectively aims to contribute to a deeper understanding of TERT promoter mutations in gliomas, offering a foundation for future research endeavors and paving the way for innovative strategies in glioma management.

**Keywords:** Diagnosis; Drug-resistance; Glioma; Metastasis; Mutation; Prognosis; Promoter; TERT.

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