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Advances and optimization strategies in prime editing of human pluripotent stem cells

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Abstract

Prime editing, first introduced in 2019, is a precise and efficient genome-editing technique with applications across various organisms and cell lines, including human pluripotent stem cells (hPSCs). Despite its revolutionary potential, prime editing of hPSCs often shows low efficiency, hindered by current delivery methods and DNA repair mechanisms. In this review, we explore prime editing of hPSCs, emphasizing the optimization necessary for creating ex vivo and in vitro disease models, which are critical for developing personalized therapeutics. We discuss key prime-editing methods for hPSCs, optimization strategies, tools available for prime editing, and the rigorous quality control required before and after genome engineering for downstream applications.

Keywords: cas9 nickase; delivery methods; hPSC; pluripotent stem cells; prime editing; prime-editing efficiency.

Conflict of interest statement

Declaration of interests H.G., T.M., L.D., and M.G-H. declare no conflict of interest. The authors declare that the research was conducted in the absence of any commercial of financial relationships that could be construed of a conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

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