Center for Stem Cell Biology and Regenerative Medicine

Division of Stem Cell Processing
幹細胞プロセシング分野

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Stem cells represent a valuable cell source in the field of regenerative medicine. Human induced pluripotent stem cells (hiPSCs) have emerged as a promising tool, being utilized both in basic research and in the development of curative treatments for various diseases. Our focus has been specifically on precise control of the hiPSC differentiation process, thereby developing safe and effective cell replacement therapy for patients suffering from a wide range of currently incurable conditions.

Highly efficient generation of hiPSC derived proliferative hepatic progenitor for disease treatment

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Although hiPSC holds immense potential for cell replacement therapy for disease treatment, challenges such as cellular heterogeneity and potential tumorigenicity have significantly limited their clinical applications. To address these challenges, we propose a transplantation therapy strategy based on hiPSC-derived proliferative progenitors that effectively mitigates issues of cellular heterogeneity and residual undifferentiated hiPSC. In this study, we developed a protocol that accurately directs hiPSC to differentiate into hepatic progenitors with a purity exceeding 99%. Notably, these hiPSC-derived hepatic progenitors maintained their purity and characteristic properties under optimized culture conditions, ensuring sufficient cell quantities to meet the demands of clinical applications. Long-term transplantation experiments further confirmed the absence of tumor formation risk in these cells. Moreover, we demonstrated that hiPSC-derived hepatic progenitors exhibit robust *in vivo* repopulation capacity, leading to significant improvements in liver diseases. These findings highlight the enhanced safety and flexibility of hiPSC-derived proliferative progenitor-based transplantation therapy for disease treatment. Moving forward, we aim to establish a GMP-grade manufacturing process for the generation and expansion of hiPSC-derived hepatic progenitors, thereby accelerating the clinical translation of hiPSC-based cell replacement therapies.