OCT 21th 2025 | 4:00PM CET VIRTUAL

iPSZÜRICH

A Lecture Series Focused on Induced Pluripotent Stem Cells

京都大学 iPS細胞研究所 CiRA (サイラ)

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Toward Scalable Manufacturing of Universal iPSC-Derived Platelets: Clinical and Technological Perspectives

We are currently advancing the development of artificial platelets derived from induced pluripotent stem cell (iPSC)–based immortalized megakaryocyte cell lines, utilizing a second-generation imMKCL system that lacks HLA class I expression (unpublished), building upon our first-generation imMKCLs previously reported (Cell Stem Cell, 2014). These cell lines serve as master cell banks for platelet production under Good Gene, Cellular, and Tissue-based Products Manufacturing Practice (GCTP) standards, equivalent to current Good Manufacturing Practice (cGMP).

A first-in-human clinical study (iPLAT1) has been completed, in which autologous iPSC-derived platelets were transfused into a patient with thrombocytopenia complicated by alloimmune platelet transfusion refractoriness (allo-PTR). This study demonstrated the safety of both the manufacturing process and the final product (Blood, 2022; Blood Advances, 2022).

In parallel, reverse translational research inspired by the clinical findings has yielded valuable insights. In this presentation, I will highlight specific examples that have informed the research and development of next-generation iPSC-derived artificial platelets. Building on these advances, we are now collaborating with multiple industrial partners to accelerate clinical translation, leveraging continuous manufacturing technologies including turbulence-mediated bioreactor (Cell, 2018).