Fully Naive Induced Human Pluripotent Stem Cells (iPSC) (Yeda)

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Summary

A novel method to revert human iPSC to a fully naive state, retaining stable pluripotency. The feasibility for the existence of ground state naive pluripotency in human embryonic stem cells (hESC) has long been researched. This innovative technology supplies the composition of chemically defined conditions required for derivation and long term maintenance of such cells, without genetic modification. Human naive pluripotent cells can be robustly derived either from already established conventional hESC lines, through iPSC reprogramming of somatic cells, or directly from ICM of human blastocysts. The new human pluripotent state was isolated and characterized; it can open up new avenues for patient specific disease relevant research and the study of early human development.

Applications

Reprogramming kits- Somatic cells to iPSC at near 100% efficiency (7days), iPSC to fully naive state.

Advantages

Deterministic iPSC reprogramming with no genetic modification required.
Stable pluripotency, with low propensity for differentiation
Reagents available off-the-shelf.

echnology's Essence

allmark features of rodent naive pluripotency include driving Oct4expression by its distal enhancer, retaining pre-inactivation state of X chromosome in female pluripotent cell lines amongst others. Naive mouse ESCs pigenetically drift towards a primed pluripotent state; while human embryonic stem cells (hESCs) share everal molecular features with naive mESCs (e.g. expression of NANOG, PRDM14 and KLF4 naive pluripotency romoting factors), they also share a variety of epigenetic properties with primed murine Epiblast stem cells mEpiSCs). These observations have raised the question of whether conventioal human ESCs and induced uripotent stem cells (iPSCs) can be epigenetically reprogrammed into a different pluripotent state, xtensively similar with rodent na?ve pluripotency. Researchers at the Weizmann Institute discovered that upplementation of certain chemically defined conditions, synergistically facilitates the isolation and aintenance of pluripotent stem cells that retain growth characteristics, molecular circuits, a chromatin ndscape, and signaling pathway dependence that are highly similar to naive mESCs, and drastically distinct om conventional hESCs.

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