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Long-term Maintenance of Human Pluripotent Stem Cells in Defined Media and Feder-Free Condition using Recombinant Protein Human DJ-1

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Conventional human pluripotent stem cell (hPSC) cultures require high concentrations of expensive human fibroblast growth factor 2 (hFGF-2) for hPSC self-renewal and pluripotency in defined media for long-term culture. The thermal instability of the hFGF-2 mandates media change every day, which makes hPSC culture costly and cumbersome. Human DJ-1 (hDJ-1) can bind to and stimulate FGF receptor-1. In this study, for the first time, we have replaced hFGF-2 with hDJ-1 in the essential eight media and maintained the human embryonic stem cells (hESCs), H9, in the defined media at feeder-free condition. After more than ten passages, H9 in both groups still successfully maintained the typical hESC morphology and high protein levels of pluripotency markers, SSEA4, Tra1-60, Oct4, Nanog, and ALP. DNA microarray revealed that more than 97% of the 21,448 tested genes, including the pluripotency markers, Sox2, Nanog, Klf4, Lin28A, Lin28B, and Myc, have similar mRNA levels between the two groups. Karyotyping revealed no chromosome abnormalities in both groups. They also differentiated sufficiently into three germ layers by forming in vitro embryoid bodies and in vivo teratomas. There were some variations in the RT-qPCR assay of several pluripotency markers. The proliferation rates and the mitochondria of both groups were also different. Taken together, we conclude that hDJ-1 can replace hFGF-2 in maintaining the self-renewal and the pluripotency of hESCs in feeder-free conditions for the long term.

Biography

Julee Kim received her diploma degree in Biotechnology at the Westfaelisch Wilhelms University of Muenster in 2007. She graduated from the Westfaelisch Wilhelms University of Muenster with a PhD degree in Biology at the Max Planck Institute for Molecular Biomedicine in 2013. She completed her post-doctoral training at the University of California San Francisco and at Columbia University, Irving Cancer Research Center. She worked as a research assistant professor at the University of Ulsan College of Medicine, Asan Medical Center and as a research professor at CHA University. She has 8 publications in international journals. She presented papers in more than 10 national and international conferences.

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