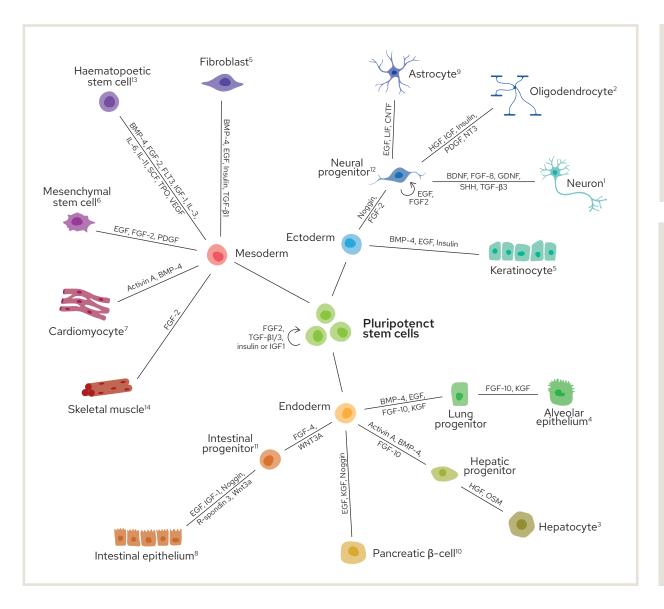
hPSC directed differentiation



Pluripotent stem cells have infinite capacity; they can self-renew indefinitely and differentiate to any cell in the body, given the right conditions. Directed differentiation of human pluripotent stem cells (hPSCs) towards specific cell types, through defined culture conditions, provides significant promise in the field of regenerative medicine, drug discovery, and disease modelling. This overview depicts the growth factors required to derive different cell types from hPSCs, with all methods corresponding to published work on human cells.

References

 Chambers, S. M. et al. Highly efficient neural conversion of human ES and iPS cells by dual inhibition of SMAD signaling. Nat Biotechnol 27, 275–280 (2009).
Douvaras, P. et al. Efficient Generation of Myelinating Oligodendrocytes from Primary and the second secon

Progressive Multiple Sclerosis Patients by Induced Pluripotent Stem Cells. Stem Cell Reports 3, 250-259 (2014).

3. Hannan, N. R. F., Segeritz, C.-P., Touboul, T. & Vallier, L. Production of hepatocyte-like cells from human pluripotent stem cells. Nat Protoc 8, 430–437 (2013).

4. Huang, S. X. L. et al. Highly efficient generation of airway and lung epithelial cells from human pluripotent stem cells. Nat Biotechnol 32, 84–91 (2014).

5. Kim, Y. et al. Establishment of a complex skin structure via layered co-culture of keratinocytes and fibroblasts derived from induced pluripotent stem cells. Stem Cell Research & Therapy 9, 217 (2018).

 Lian, Q. et al. Functional Mesenchymal Stem Cells Derived From Human Induced Pluripotent Stem Cells Attenuate Limb Ischemia in Mice. Circulation 121, 1113–1123 (2010).
Lundy, S. D., Zhu, W.-Z., Regnier, M. & Laflamme, M. A. Structural and Functional Maturation of Cardiomyocytes Derived from Human Pluripotent Stem Cells. Stem Cells Dev 22, 1991–2002 (2013).

 Negoro, R. et al. Efficient Generation of Small Intestinal Epithelial-like Cells from Human iPSCs for Drug Absorption and Metabolism Studies. Stem Cell Reports 11, 1539–1550 (2018).
Perriot, S., Canales, M., Mathias, A. & Du Pasquier, R. Differentiation of functional astrocytes from human-induced pluripotent stem cells in chemically defined media. STAR

Protocols 2, 100902 (2021). 10. Russ, H. A. et al. Controlled induction of human pancreatic progenitors produces

functional beta-like cells in vitro. EMBO J 34, 1759–1772 (2015).

 Spence, J. R. et al. Directed differentiation of human pluripotent stem cells into intestinal tissue in vitro. Nature 470, 105–109 (2011).

 Soubannier, V. et al. Characterization of human iPSC-derived astrocytes with potential for disease modeling and drug discovery. Neuroscience Letters 731, 135028 (2020).
Sugimura, R. et al. Haematopoietic stem and progenitor cells from human pluripotent stem cells. Nature 545, 432–438 (2017).

14. van der Wal, E. et al. Large-Scale Expansion of Human iPSC-Derived Skeletal Muscle Cells for Disease Modeling and Cell-Based Therapeutic Strategies. Stem Cell Reports 10, 1975–1990 (2018).

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