Cardiac regenerative therapy using metabolically purified cardiomyocytes balls derived from human iPSCs

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Heart regenerative therapy using pluripotent stem cells (PSC) is a promising strategy for patients with heart disease, but the inability to eliminate residual undifferentiated stem cells and generate highly purified cardiomyocytes in sufficient quantities has been a barrier to realizing this potential. Our previously established non-genetic purification method of cardiomyocytes using mitochondrial dye is efficient but not suitable to produce large-scale cardiomyocytes due to the usage of FACS (Nat Methods 2010). To overcome these problems, we developed a novel method for purifying the bulk of PSC-derived cardiomyocytes by focusing on glucose and lactate metabolism in cardiomyocytes and PSCs (Cell Stem Cell 2013). In addition, minute research of amino acids metabolic profiles in human PSCs allowed for clinical-grade purification of matured cardiomyocytes (in revision). Finally, we succeeded to efficiently make a large number of metabolically purified cardiomyocytes balls derived from human PSCs. These technologies will strongly boost regenerative medicine.