Comparative Study of Hematopoietic Differentiation between Human Embryonic Stem Cell Lines.

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Public Summary:
Directed differentiation of human embryonic stem cells (hESCs) into any desired cell type has been hailed as a therapeutic promise to cure many human diseases. However, substantial roadblocks still exist for in vitro differentiation of hESCs into distinct cell types, including T lymphocytes. Here we examined the hematopoietic differentiation potential of six different hESC lines under several differentiation conditions. We found diverse hematopoietic potential between hESC lines depending on the culture or passage conditions. In contrast to fetal-derived hematopoietic precursors, hematopoietic precursors differentiated from hESCs were unable to develop further into T cells. These data underscore the difficulties in the current strategy of hESC forward differentiation and highlight distinct differences between hematopoietic precursors generated in vitro versus in vivo.

Scientific Abstract:
Directed differentiation of human embryonic stem cells (hESCs) into any desired cell type has been hailed as a therapeutic promise to cure many human diseases. However, substantial roadblocks still exist for in vitro differentiation of hESCs into distinct cell types, including T lymphocytes. Here we examined the hematopoietic differentiation potential of six different hESC lines. We compare their ability to develop into CD34(+) or CD34(+)CD45(+) hematopoietic precursor populations under several differentiation conditions. Comparison of lymphoid potential of hESC derived- and fetal tissue derived-hematopoietic precursors was also made. We found diverse hematopoietic potential between hESC lines depending on the culture or passage conditions. In contrast to fetal-derived hematopoietic precursors, none of the CD34(+) precursors differentiated from hESCs were able to develop further into T cells. These data underscore the difficulties in the current strategy of hESC forward differentiation and highlight distinct differences between CD34(+) hematopoietic precursors generated in vitro versus in vivo.