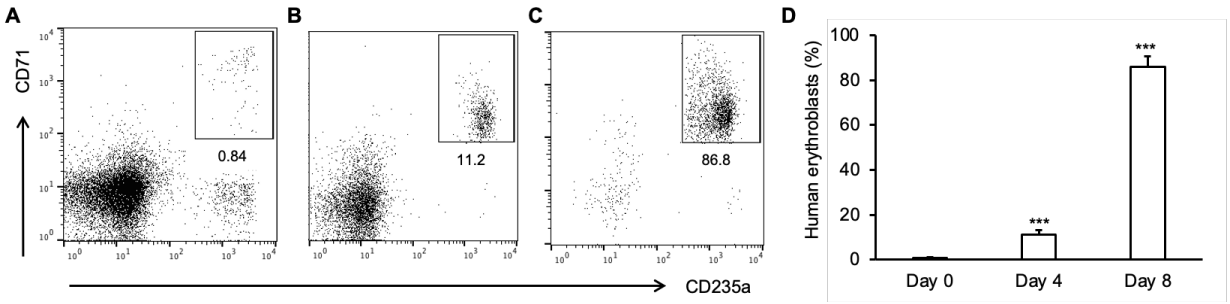
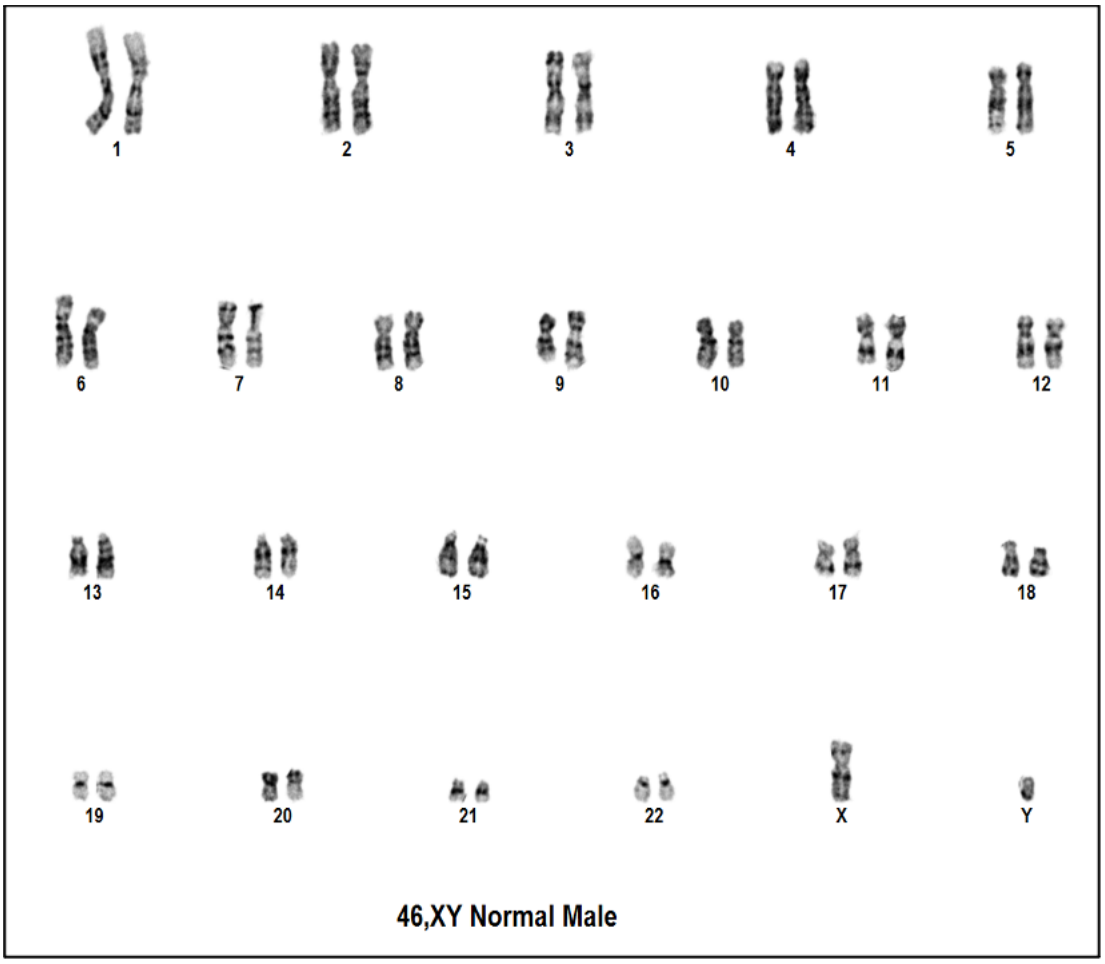
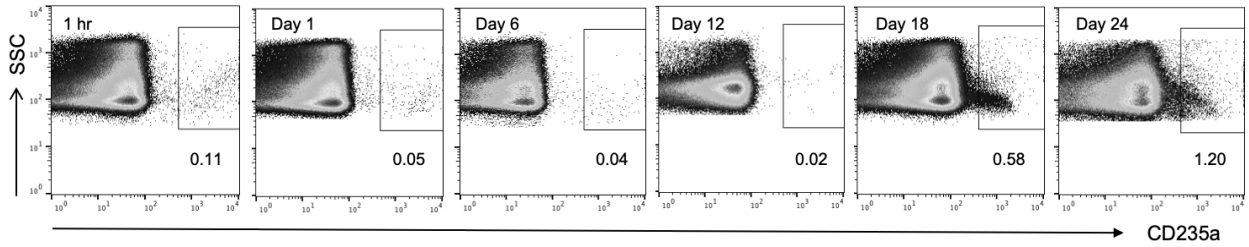
Online Supplementary material



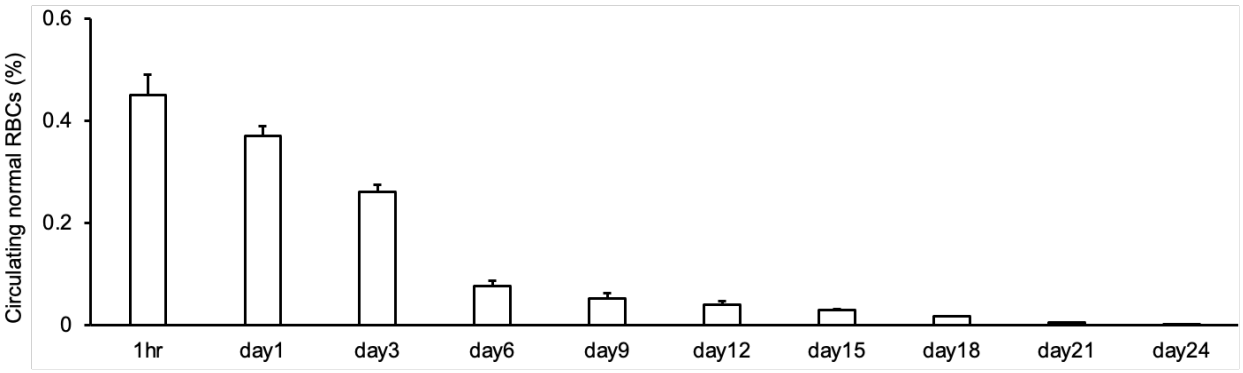
Supplementary Figure 1. Expansion of human primary erythroblasts. Mononuclear cells were isolated from peripheral blood of healthy donors, and cultured in SFEM II medium containing human EPO, holo-transferrin, SCF, IL-3 and IGF-1 for 8 days. Human erythroblasts in the culture were profiled by flow cytometry with anti-human CD235a (FITC) and CD71 (APC) on day 0 (**A)**, day 4 (**B**) or day 8 (**C**). CD235a and CD71 double positive human erythroblasts were gated. (**D**) The percentage of human erythroblasts in the culture was calculated; data were from three independent experiments.



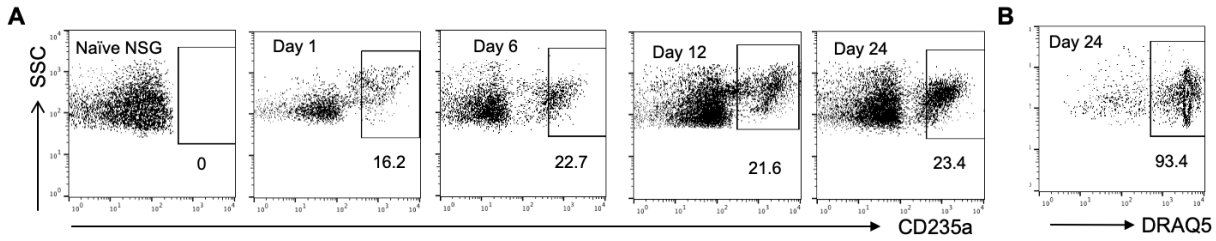
Supplementary Figure 2. Karyotyping of iPSC cell line. Human IPSC harvested from culture were subjected to stained by Giemsa banding for karyotype analyses, and photographed (20×).



Supplementary Figure 3. Circulating human iPSC-RBCs (Derived from another iPSC cell line) in NSG mice. Human iPSC-RBCs were transfused into CL and CV-treated NSG mice. Murine peripheral blood was collected at different time points after transfusion for flow cytometry analyses with anti-human CD235a antibody. $CD235a^{+}$ human iPSC-RBCs were gated. Data were presented from one of the three independent experiments.



Supplementary Figure 4. Normal human RBCs in NSG mice. Normal human RBCs were transfused into NSG mice treated with the combination of CL and CVF before and after transfusion. Murine peripheral blood was collected at different time points after transfusion for flow cytometry analyses with anti-human CD235a antibody. The percentages of circulating human iPSC-RBCs in murine peripheral blood at the time points were calculated from three independent experiments.



Supplementary Figure 5. Homing of nucleated iPSC-RBCs (Derived from another iPSC cell line) in murine bone marrow after transfusion. (**A**) Bone marrow cells were isolated from iPSC-RBCs transfused NSG mice on day 1, day 6, day 12 and 24 after transfusion. Bone marrow cells from naïve NSG mice served as $CD235a^-$ control cells. The cells were profiled by flow cytometry with anti-human CD235a antibody. Dot plots were represented from one of the three independent experiments. (**B)** Bone marrow human $CD235a^+$ cells on day 24 were further stained with DRAQ5 dye. $DRAQ5^+$ cells were gated and presented as dot plot. Data were presented from one of the three independent experiments.