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Data analysis of single-HSC transplantation

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Hematopoietic system is maintained by hematopoietic stem cells (HSCs) with dual abilities of long-term self-renewal and differentiation to all types of blood cells. Recently, using a single-cell transplantation system and mice expressing a fluorescent protein, myeloid-restricted progenitors with long-term repopulating activity (MyRPs) were found. Moreover, by using paired daughter cell assay, MyRPs were directly differentiated from HSCs.

In this study, we investigated hematopoietic system incorporating the novel insight that there existed a cell type that exclusively differentiated to myeloid lineages. There were four types of populations in the model: (i) HSCs, (ii) MyRPs, (iii) progenitors, and (iv) differentiated cells. Differentiated cells includes B cell and T cell which are lymphoid cells and platelet, erythrocyte and neutrophil/monocyte as myeloid cells. Myeloid progenitors were produced via two ways, from HSCs directly and via MyRP (myeloid bypass), after transplantation of a single HSC, while lymphoid progenitors were produced from only HSCs directly. This is the first study of investigating hematopoiesis with MyRPs.

We estimated some parameters which were growth rate, production rate and death rate using full data set of single-cell transplantation. From the result of data analysis, we will discuss the role of myeloid bypass after transplantation and the change of heterogeneity of HSC population with age.

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