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Finding the rules of blood regeneration

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Much of complex biology results from interactions among a large number of individually simpler elements. Blood regeneration is no different. About 100 billion new blood cells are made everyday from a much smaller yet a large population of diverse stem cell population. I will present a phenomenological model of blood regeneration, which provides a framework to understand large variation (˜3 orders of magnitude) among contributions from individual stem cells observed in recently reported experiments with primates. We show that a combination of slow stem cell differentiation to progenitor followed by their bursty amplification is at the heart of this observed variability. With our model we develop a counter hypothesis to the role of cell-level differences as an explanation for the large variability and highlight the role of progenitors in maintaining blood homeostasis.

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