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Interaction between Differentiating Cell- and Niche-Derived Signals in Hematopoietic Progenitor Maintenance

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Maintenance of a hematopoietic progenitor population requires extensive interaction with cells within a microenvironment or niche. In the Drosophila hematopoietic organ, niche-derived Hedgehog signaling maintains the progenitor population. Here, we show that the hematopoietic progenitors also require a signal mediated by Adenosine deaminase growth factor A (Adgf-A) arising from differentiating cells that regulates extracellular levels of adenosine. The adenosine signal opposes the effects of Hedgehog signaling within the hematopoietic progenitor cells and the magnitude of the adenosine signal is kept in check by the level of Adgf-A secreted from differentiating cells. Our findings reveal signals arising from differentiating cells that are required for maintaining progenitor cell quiescence and that function with the niche-derived signal in maintaining the progenitor state. Similar homeostatic mechanisms are likely to be utilized in other systems that maintain relatively large numbers of progenitors that are not all in direct contact with the cells of the niche.

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