Hematopoietic stem cell regulation by extrinsic and metabolic factors

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Place: Lecture room 2, Medical Education & Library Building 3F
医学教育図書棟3階 第2講義室

Abstract

Hematopoietic stem cells (HSCs) are the origin of all blood cells and maintained for throughout life to ensure the homeostasis of the blood system. HSCs exhibit an innate capacity for self-renewal and differentiation, yet their cell fate largely alters according to life-stage and extrinsic stresses. HSCs are predominantly proliferative in the fetal liver yet enter cell cycle dormancy and rarely proliferate within the adult bone marrow (BM). BM HSCs rapidly switch to proliferation and differentiate to replenish mature blood cells upon stresses such as inflammation. This versatility allows the use of physiological HSCs in stem cell-based therapies, yet the precise understanding of HSC regulation is necessary. This seminar will focus on the physiological regulation of adult and developmental HSCs by both cell extrinsic and intrinsic mechanisms. We have studied the effects of the cytokine, thrombopoietin (Thpo) signaling on HSCs (Cell Reports, 2018, Blood 2021) and our data identified unique metabolic profiles in HSCs which survive Thpo deficiency. We will discuss the multifaceted roles of Thpo signaling in lineage-specific differentiation as well as HSC maintenance through metabolic alterations, especially focusing on mitochondrial metabolism.

Major Publications (1) Nakamura-Ishizu A, Chin WLD, Matsumura T, Tan DQ, Mochizuki-Kashio M, Jianwen D, Suda T. Prolonged maintenance of hematopoietic stem cells that escape from thrombopoietin deprivation. . Blood 2021 May 13;137(19):2609-2620. (2) Nakamura-Ishizu A, Ito K. and Suda T. Hematopoietic stem cell metabolism during development and aging. Developmental Cell. 2020 Jul 20;54(2):239-255 (3) Nakamura-Ishizu A, Matsumura T, Stumpf PS, Umemoto T, Takizawa H, Takihara Y, O'Neil A, Majeed ABBA, MacArthur BD, Suda T. Thrombopoietin Metabolically Primes Hematopoietic Stem Cells to Megakaryocyte-Lineage Differentiation. Cell Rep. 2018 Nov 13;25(7):1772-1785.e6.

◆Inviter: Prof. TAKIZAWA Hitoshi (Stem Cell Stress) ／滝澤仁 教授（幹細胞ストレス学）
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