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The novel mesenchymal stromal niche cell in the bone marrow endosteum

Hematopoietic stem cells (HSCs) are responsible for blood cell production throughout the lifetime of individuals. Interaction of HSCs with their supportive microenvironmental niche, which is composed of cellular components located around stem cells, facilitate the signaling networks that control the balance between self-renewal and differentiation. HSCs maintain a quiescent state in the bone marrow, where they anchor to specialized niches along the endosteum (the border between the bone and the BM) and in perivascular sites adjacent to the endothelium. The cells in the endosteal niche are a heterogeneous population regarding their degree of differentiation and accompanying functions. In this study, we further characterized the endosteal niche cell populations by using the single-cell gene expression analysis and identified a small subpopulation in ALCAM+Sca-1– osteoblastic cell fraction that expressed pluripotent stem cell markers. Furthermore, this subpopulation of ALCAM+Sca-1– cells specifically expressed Cdh2. Also, this newly identified subpopulation could differentiate into osteoblast, adipocyte, and chondrocyte, and showed the gene expression pattern that closes to ES cells rather than other bone marrow MSC populations. We also evaluated the function of ALCAM+Sca-1–Cdh2+ cells and found that have the potential to maintain the self-renewal activity of HSCs. These data suggest that ALCAM+Sca-1–Cdh2+ cells are mesenchymal stromal cells with niche cell activity for HSCs.

Biography

Fumio Arai is a Professor at the Department of Stem Cell Biology and Medicine, Graduate School of Medical Sciences, Kyushu University. He has completed his PhD from Meikai University and Post-doctoral studies from Keio University School of Medicine. His research interest is in studying the mechanisms of the cell fate regulation of HSCs at the single cell level for the establishment of the system that can expand HSCs.

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