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Elevated hematopoietic stem cell frequency in mouse alveolar bone marrow

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マウス歯槽骨骨髓における造血幹細胞頻度の上昇

Hematopoietic stem cells (HSCs) are maintained by bone marrow niches, but most studies use femur/tibia BM. In this paper, the authors asked whether HSC frequency differs across bones and why alveolar bone marrow (al-BM) might be distinct.

They compared BM from nine skeletal sites by flow cytometry (HSPC: KSL; HSC/LT-HSC: CD34/CD150 and HOXB5 reporter). HSC function was tested by competitive transplantation (including secondary transplant) and a 10-cell HSC transplant assay. They also performed PVA-based cultures, cell-cycle (Ki67/DAPI) and apoptosis (Annexin V) analyses, and examined niche populations, focusing on stromal cells expressing Kitl and Cxcl12 and macrophage Osm expression.

al-BM showed the highest frequency of immunophenotypic HSCs among the nine sites, and HOXB5⁺ LT-HSCs were also enriched in al-BM. Whole BM transplantation resulted in higher donor chimerism from al-BM than femur/tibia/pelvis BM, while the 10-cell HSC transplant showed no major functional difference per HSC between sites. In vitro, al-BM cells expanded more overall, mainly in progenitor populations, and al-BM KSL cells were more quiescent and showed less apoptosis. Niche analysis indicated higher frequencies of HSC-supporting stromal populations (SSC/BCSP/Thy1⁺) with high Kitl/Cxcl12 expression, and CD11b⁺ myeloid (Mo/Mac-enriched) cells in al-BM expressed higher Osm. The authors propose that a more supportive niche in al-BM may promote HSC retention, although this mechanism was not directly tested.

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