Dispensable roles of CD200 in bone development

Yuta Nakai1 and Noriaki Ono1

1University of Texas Health Science Center at Houston School of Dentistry, Houston, TX, USA

Objectives: CD200, known as OX-2, is a cell surface transmembrane protein that is expressed on various types of bone marrow cells, such as B lymphocytes, T lymphocytes, dendritic cells, and endothelial cells. CD200 delivers immunosuppressive signals through its receptor CD200R, which is expressed on monocytes/myeloid cells and T lymphocytes. The skeleton is a highly dynamic organ that persistently undergoes changes and regeneration. It consists of specialized bone cells, such as chondrocytes, osteoblasts, adipocytes, and stromal cells. A variety of self-renewal and multipotent skeletal stem cells (SSCs) supplies local osteogenic cells. Recently, several groups reported that CD200 is a cell surface marker for SSCs. However, it remains unclear whether CD200 plays a functional role in bone development. In this study, we aimed to evaluate the physiological contribution of CD200 to skeletal development using CD200-/- global knockout (CD200-gKO) and Prrx1-cre-based osteochondro-progenitor-directed CD200 conditional knockout (CD200-cKO) mice.

Experimental methods: CD200-gKO and CO200-cKO mice were analyzed at P21 and 8 weeks of age. CD200 expression in the femur was determined by immunohistochemistry and flow cytometry. The bone morphology was evaluated by 3D micro-CT.

Results: CD200-positive cells were located in the trabecular bone surface and in the periosteum, which were abrogated both in CD200-gKO and CD200-cKO mice. Next, CD200 in hematopoietic cells was examined. Flow cytometry analysis revealed that CD200 expression in CD45-negative stromal cells was specifically abrogated in CD200-cKO mice, while CD200 expression in CD45-positive cells was unchanged. Finally, 3D micro-CT evaluation showed no statistical difference in bone mass between WT and CD200-gKO or CD200-cKO mice, associated with unchanged bone parameter.

Conclusion: CD200 plays a dispensable role in bone development.