

Characteristics of PDGFR α positive mesenchymal stromal cells in various tissues

Kurosawa Tamaki^{1,2}, Noriyuki Kaji³, Madoka Uezumi², Heying Zhou², Akiyoshi Uezumi², Masatoshi Hori¹

¹Lab. of Veterinary Pharmacol., Dept. of Veterinary Med. Sci., Grad. Sch. of Agr. and Life Sci., Tokyo Univ.,

²Muscle Aging and Regenerative Med., Tokyo Metropolitan Inst. of Gerontol., ³Lab. of Veterinary Pharmacol., Sch. of Veterinary Med., Azabu Univ.

Mesenchymal stem cells are defined in vitro by the ability to form fibroblastic colony and differentiate into adipocytes, osteocytes, and chondrocytes. Although PDGFR α ⁺ cells are thought to be the origin of mesenchymal stem cells in various tissues, their roles in each organ have not been elucidated. Here, we compared characters of PDGFR α ⁺ cells derived from several organs such as lung, liver, small intestine, heart, subcutaneous fat, and skeletal muscle to clarify their specific functions in each organ.

We first compared differentiation potentials of PDGFR α ⁺ cells residing in various tissues. We cultured PDGFR α ⁺ cells isolated from each tissue by FACS and induced them to differentiate into several mesenchymal lineages. Consequently, each PDGFR α ⁺ population showed distinct differentiation potential. To investigate their roles in respective organs, we performed RNA-Seq and revealed that PDGFR α ⁺ cells have gene expression patterns unique to their original organ, suggesting that they have specific functions depending on the tissue where they reside. Among these tissues, we focused on skeletal muscle because PDGFR α ⁺ cells in muscle have been shown to be essential for homeostatic muscle maintenance. Using RNA-seq data of PDGFR α ⁺ cells from various tissues of young and aged mice, we identified several genes that are specifically expressed in PDGFR α ⁺ cells derived from young muscles. We expect that these genes play important roles to maintain muscle integrity and we will pursue a study to elucidate their functions.