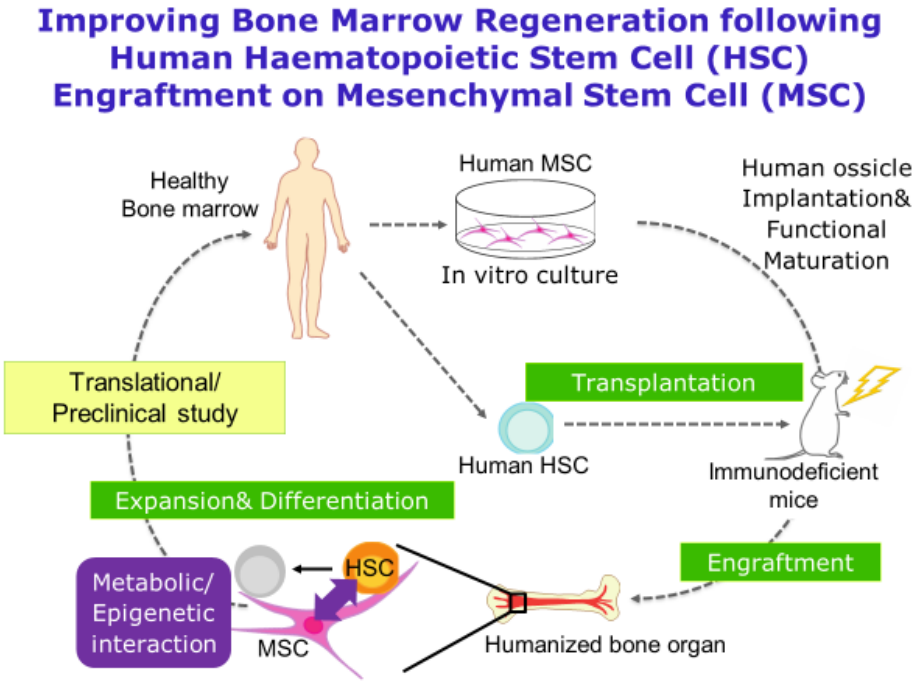
Improving haematopoietic reconstitution in blood stem cell transplantation procedures through the regulation of stem cells and their niches

TAKIZAWA Hitoshi

Professor, International Research Center for Medical Sciences, Kumamoto University

Haematopoietic stem cell (HSC) transplantation (HSCT) is now routinely performed to save the life of patients with haematological, genetic, and metabolic disorders. Regenerating normal blood cell production after chemotherapy/irradiation relies upon 3 key steps: 1) harvesting sufficient donor HSCs, 2) optimal HSC homing to the bone marrow, and 3) expansion and differentiation of donor HSCs in the recipient. However, efficacy of HSC engraftment significantly decreases during ageing and in certain haematological diseases, hampering the use of HSC transplantation as a therapeutic option. Increasing the success of HSCT requires a more detailed understanding of the factors which affect HSC engraftment, maintenance, proliferation and differentiation. Thus, this proposal aims at understanding and modelling the regeneration process following HSCT. The main goal is to identify cell-intrinsic and -extrinsic mechanisms as well as the cellular interactions with the surrounding microenvironment that regulate HSC proliferation and lineage commitment during bone marrow regeneration. Our translational aim is instructing HSC to more efficiently/rapidly/long-lastingly regenerate the haematopoietic and immune systems. The complementary expertise of the Japan-UK teams raise confidence that these current limitations in HSCT can be overcome.



■ URL:
https://ircms.kumamoto-u.ac.jp/research/hitoshi_takizawa/