Bone Marrow Research

Hindawi

Special Issue on
Bone Marrow Stem Cell Niche in Disease

CALL FOR PAPERS

Bone marrow is the residence of diverse cell types, ranging from the mature immune cells of innate and adaptive immune responses, the rapid and slow dividing hematopoietic progenitor cells, the quiescent long-term repopulating hematopoietic stem cells (HSCs), and the supporting cells, all of which coexist and share the marrow space. This space is organized into distinct microenvironments (niches), to support and regulate the functions of the diverse hematopoietic populations. Supporting cells, such as osteoblasts, osteoclasts, endothelial cells, adipocytes, and mesenchymal stem cells (MSCs), closely interact with the hematopoietic stem cell within these niches, via a range of cell adhesion molecules and secreted factors, thereby regulating its activity. Extensive studies over the past few decades have unraveled the structural elements of the HSC niche and have demonstrated that this specialized microenvironment is characterized by circulating chemokines, low metabolic activity, and low ROS levels. The niche activity is dynamically regulated by endocrine signals and neural input. Hence conditions, that disrupt the structural and molecular elements of the niche, alter the function of the HSC, thereby altering the frequency and fates of the progenitors and mature immune cells resident in the marrow.

Work done in the past few years has uncovered intimate connections between the BM niche and multiple diseases. In hematological malignancies, malignant cells divert the normal marrow microenvironment to support its own functions, while suppressing normal hematopoiesis. The marrow niche has also been shown to serve as a 'parking space' for circulating solid tumor cells, in pancreatic, breast, and lung cancers. These cells establish dormancy within the protective BM niche, by displacing the resident HSCs. Significant alterations of these specialized marrow microdomains were found in other diseases, like obesity, diabetes, and autoimmune diseases. While increased adipocyte numbers within the marrow disrupt the interaction between HSCs and its supporting cells in obesity, high circulating glucose in diabetic patients results in poor mobilization of CD34+ hematopoietic stem and progenitor cells. Destruction of the bony trabeculae, the physical structure of the niche, by bone resorption triggers the HSC to vacate the niche. This is seen in autoimmune arthritis, where T lymphocytes trigger bone loss by inducing differentiation of osteoclasts.

This special issue invites investigators to submit review and original research articles discussing recent advances in the field of bone marrow niche in different disease states.

Potential topics include but are not limited to the following:

- Molecular changes in the BM niche in hematological malignancies
- Dormancy/metastasis of solid tumors and the BM niche
- Effect of metabolic syndromes on the marrow niche and vice versa
- The effect of autoimmune changes on niche composition and function
- Role of endocrine dysfunctions on the marrow hematopoietic niche
- Crosstalk between the hematopoietic niche of the bone marrow and spleen in disease states
- Rare cases of ectopic bone marrow and niche formation
- The role of BM niche in transplantation and graft-versus-host disease (GVHD)
- Systems approach to study the molecular profile of BM niche
- Pharmacological interventions targeted at the BM microenvironment

Authors can submit their manuscripts through the Manuscript Tracking System at http://mts.hindawi.com/submit/journals/bmr/bmsc/.

Lead Guest Editor
Devaveena Dey, Harvard Medical School, Boston, USA
devaveena.dey@gmail.com

Guest Editors
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zhumur@jcbose.ac.in

Thomas Davis, Naval Medical Research Center, Silver Spring, USA
thomas.davis1@med.navy.mil

Amitava Sengupta, Indian Institute of Chemical Biology, Kolkata, India
amitava.sengupta@iicb.res.in

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