

Developmental Hematopoiesis

Guest Editors

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Preface

Stem cell biology is one of the most rapidly developing and exciting fields in the Life Sciences. The biology of embryonic and adult stem cells is critically important for understanding development, tissue homeostasis, reprogramming and cancer. Stem cells are characterised by their capacity to self-renew and differentiate into one or several cell types and hold great promise for regenerative medicine. The purification and tissue localization of stem cells, as well as identification of intrinsic and extrinsic factors regulating their functions, are central topics in stem cell biology.

Hematopoietic stem cells (HSCs) are one of the best studied models and represent a key paradigm for analysis of various stem cell types. The availability of antibodies recognizing surface markers has been instrumental for enrichment and localization of HSCs. *In vivo* and *in vitro* assays offer researchers the possibility to study hematopoietic stem and progenitor cells at the functional level. For several decades bone marrow and more recently cord blood HSCs have been used for treatment of patients with hematopoietic disorders such as leukemia.

In the adult, HSCs are at the base of the entire blood system providing a life-long supply of lymphoid and erythromyeloid cells to the animal. They are localized to the specialized bone marrow (BM) microenvironment, called HSC niches. During embryonic development, HSCs are generated in a specific embryonic area(s) prior to the formation of bone marrow and colonise it only at later developmental stages. Multi-site migratory and dynamic hematopoietic activity in the embryo makes analysis of molecular and cellular mechanisms underlying HSC production a challenging task. Identification of precise cellular pathway(s) and molecular signalling underlying the specification and formation of definitive HSCs in the embryo is a pivotal issue in HSC biology of considerable potential importance for regenerative medicine.

The aim of this Special Issue of *The International Journal of Developmental Biology (Int. J. Dev. Biol.)*, is to provide the scientific community with updated reviews covering multiple facets of developmental hematopoiesis. Papers presented here demonstrate the importance of use of a large variety of experimental models from embryonic stem (ES) cells to human embryos for a better understanding of developmental hematopoiesis. This issue is divided into several sections: 1) embryonic stem cells as a model for studying hematopoietic development, 2) embryonic hematopoietic tissues, 3) molecular pathways controlling HSC activities and 4) HSCs and gene networking.

We would like to thank Prof. Juan Arechaga, Editor-in-Chief of the *Int. J. Dev. Biol.* for offering us the opportunity to edit this Special Issue on Hematopoietic Development and also the journal Editorial Team for bringing it to fruition. We thank all the authors who contributed to this Special Issue for their efforts which enabled creating a broad and in-depth overview of development of the blood system. Our particular thanks also to our colleagues who accepted to share original pictures of their favorite model to assemble the beautiful cover of this Special Issue, for whose conception, we are indebted to Sophie Gournet. Given space constraints, we apologise for not being able to invite for participation in this Issue all our colleagues whose research contributes to this field.

We hope that experienced stem cell biologists and younger investigators will find this Special Issue informative and useful for their research.

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