

PREFACE

This second volume of the "Advances in Stem Cells and Their Niches" series is dedicated to the *Intestinal Stem Cell Niche*.

The intestinal epithelium is a monolayer of cells covering the entire lumen of the gut that constitutes an important barrier against the external environment. Both small and large intestine are formed of crypt structure where intestinal stem cells (ISCs) reside.

The ISCs reside at the crypt base alongside the Paneth cells. Contrary to the majority of adult stem cells, ISCs divide actively and give rise to all different cell types, including enterocytes, goblet cells, enteroendocrine cells, tuft cells, as well as Paneth cells.

ISCs in the crypt base are maintained by their surrounding niche for precise regulation of self-renewal and differentiation. The intestinal stem cell niche is composed of Paneth cells, stromal cells, smooth muscle cells, and neural cells as well as the extracellular matrix components.

In the first chapter, Drs. Trentesaux and Romagnolo provide a short historical summary of the progress made in our understanding and characterization of the ISCs, the regulatory niche signals, and the different cell types contributing to this niche in the adult intestine, touching briefly on ISC organoid culture.

In the second chapter, Drs. Schewe and Fodde highlight the multifunctional role played by the Paneth cells in the regulation of the ISCs. They describe how Paneth cells via sensing environmental factors like dietary changes and/or inflammatory stimuli are capable of translating these different signals into instructive pathways regulating ISCs activities.

In the third chapter, Dr. Peduto et al. describe the role of the different cell types constituting the ISC niche and more specifically discuss the recent evidence, demonstrating the involvement of gut microbiota in the regulation of ISCs fate during homeostasis and under stress conditions. In the last chapter, Dr. Lee et al. shed light into the role played by the extracellular matrix components in the regulation of ISCs in both homeostasis and during pathogenesis including inflammatory bowel disease or cancer. They also discussed some of the new development in tissue engineering using biological scaffold for regeneration medicine and disease modeling.

This book is thus not only providing an excellent description of the cellular and extracellular matrix components constituting the ISC niche,

it also described the signaling pathways involved in the ISCs regulation during homeostasis, under stress, and during disease progression. Lastly, this book highlights the new role of the microbiota in the ISC regulation and the growing multifunction of Paneth cells.

This book should thus be of interest for academic researchers, postdoctoral research fellows, and graduate students working on adult stem cells, cell signaling mechanisms, tissue engineering, and cancer development.

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