Special Issue: Cutting-Edge Research on Intestinal Immunity and Inflammation

Brief Review

Cutting-edge research on intestinal immunity and inflammation

Kiyoshi Takeda

Department of Microbiology and Immunology, Graduate School of Medicine, WPI Immunology Frontier research Center, Osaka University, Osaka, Japan

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Correspondence should be addressed to:
Kiyoshi Takeda, Department of Microbiology and Immunology, Graduate School of Medicine, WPI Immunology Frontier research Center, Osaka University, 2-2 Yamada-oka, Suita, Osaka 565-0871, Japan. Phone: +81-6-6879-3982, Fax: +81-6-6879-3989, E-mail: ktakeda@ongene.med.osaka-u.ac.jp

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Intestine is a unique tissue, which is constantly exposed to the external environment and is often a target of invasion by pathogenic microorganisms. The intestine is covered by a monolayer of epithelial cells which segregate the host from the environmental factors. Tissues that are covered by epithelial cell layers are called mucosa. These mucosal tissues are equipped with a specialized immune network–the mucosal immune system–to combat pathogenic microorganisms.

The intestinal environment is exposed to various external factors such as dietary compounds and commensal microbiota. The intestinal mucosal immune system is mostly tolerant towards these environmental factors and forms a delicate mutual relationship. However, in case of imbalance, the intestinal mucosal immune system mounts an inflammatory response against these environmental factors. Recent evidences demonstrate that the epithelial cell layer contributes to the maintenance of intestinal homeostasis by physically and chemically separating intestinal environmental factors from the mucosal immune system.

Likewise, skin is incessantly exposed to the external environment and is covered by epidermal cell layers for protection. The immune system in the skin establishes a unique system to combat invading pathogenic microorganisms as well.

In this Special Issue “Cutting-edge research on intestinal immunity and inflammation”, we focus on intestinal and skin barrier functions to survey our present knowledge of the interplay among environmental factors, epithelial cells and the immune system.

Dr. Jun Kunisawa at National Institute of Biomedical Innovation discusses the maintenance of intestinal homeostasis by environmental factors, particularly vitamin B9 and adenosine triphosphate.

Dr. Koji Hase at Keio University / The Institute of Medical Science, The University of Tokyo discusses the role of intestinal epithelial cells in the maintenance of gut homeostasis and the enhancement of barrier functions of intestinal

epithelial cells by environmental factors, particularly commensal microbiota.

Dr. Hisako Kayama at Osaka University overviews unique functions of intestinal immune cells, focusing on intestinal myeloid cells subsets.

Dr. Tetsuya Nakamura introduces a novel promising therapeutic approach, transplantation of cultured intestinal stem cells, to intestinal diseases such as inflammatory bowel diseases.

Finally, Dr. Keisuke Nagao at National Institutes of Health at U.S.A discusses the role of Langerhans cells, a unique cell subset present in the skin.

I would like to express my sincere appreciation towards all the distinguished scientists who have contributed to this special issue. Alongside, I hope that these excellent review articles will inspire all of our readers and offer some novel insight in the frontline researches of this field.