

Microbial–Host Interaction: Tolerance versus Allergy

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Microbial–Host Interaction: Tolerance versus Allergy

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Contents

VII Preface

IX Foreword

XIII Contributors

Keynote Talks

1 A Paradigm for Commensalism: The Role of a Specific Microbial Polysaccharide in Health and Disease

Kasper, D.L. (USA)

11 The Hygiene Hypothesis: Do We Still Believe in It?

Björkstén, B. (Sweden)

Development of Normal Tolerance

23 ‘ABC’ of Mucosal Immunology

Brandtzaeg, P. (Norway)

45 Innate and Adaptive Immune Pathways to Tolerance

Thornton, C.A.; Morgan, G. (UK)

63 Hitting the Mucosal Road in Tolerance Induction

Wiedermann, U. (Austria)

Global View on Nutrition-Related Health Problems in Childhood

75 Obesity – Extending the Hygiene Hypothesis

Isolauri, E.; Kalliomäki, M.; Rautava, S.; Salminen, S.;
Laitinen, K. (Finland)

91 Autoimmunity and Diet

Cerf-Bensussan, N. (France)

- 105 Eosinophilic Esophagitis: Example of an Emerging Allergic Manifestation?**
Heine, R.G. (Australia)
- 121 Microbial–Host Interactions in Inflammatory Bowel Diseases and Experimental Colitis**
Sartor, R.B. (USA)
-
- Role of Allergen Exposure in Tolerance Development
-
- 139 Development and Regulation of Immune Responses to Food Antigens in Pre- and Postnatal Life**
Renz, H.; Pfefferle, P.I.; Teich, R.; Garn, H. (Germany)
- 157 Novel Approaches in Treating Food Allergy Using Allergens**
Rancé, F. (France)
- 169 Allergen Avoidance Approaches in Food Allergy Management**
Koletzko, S.; Koletzko, B. (Germany)
-
- Nutrition and Immunological Homeostasis
-
- 185 Role of Dietary Immunomodulatory Factors in the Development of Immune Tolerance**
Prescott, S.L. (Australia)
- 201 Microbial–Host Interactions: Selecting the Right Probiotics and Prebiotics for Infants**
Salminen, S. (Finland); Collado, M.C. (Finland/Spain);
Isolauri, E. (Finland); Gueimonde, M. (Finland/Spain)
- 219 Probiotics and Prebiotics: Immunological and Clinical Effects in Allergic Disease**
Tang, M.L.K. (Australia)
- 239 Modified Proteins in Allergy Prevention**
von Berg, A. (Germany)
- 251 Summary**
- 259 Concluding Remarks**
- 267 Subject Index**

Preface

Notwithstanding the fact that the vast majority of cells in the human body are present as microbes in the gastrointestinal tract, the nature of their interactions with the host has only recently begun to emerge. The current achievements in the concept of host–microbe interactions unify early microbial contact and origins of human disease. The mainstream explanatory theories, with their roots in the original hygiene hypothesis, all underscore the role of environmental changes to provide an explanation why infectious, allergic and autoimmune diseases altogether continue to represent a substantial burden in industrialized countries worldwide. Accordingly, the environmental changes deprive the modern infant residing in affluent hygienic conditions of adequate anti-inflammatory or tolerogenic stimuli upon antigen encounter, or any stimulus permitting maturational signals to shape the immature and inexperienced gut-associated lymphoid tissue.

The same holds true for infant nutritional environment. Diet has faced profound changes that reflect industrialization, urbanization, economic development and globalization. Modern food processing has led to extensive pasteurization, ultra-heat treatment and sterilization practices, and the use of antimicrobial food additives and so, consequently, reduced microbial exposure via food.

The relations between the Western lifestyle, early microbial contact and origins of human disease comprise hygienic, dietary and medical practices that have altered the pattern of microbial exposure, particularly the composition of the gut microbiota. The diseases in question, ranging from allergic or autoimmune disease to obesity, are associated with aberrant antigen absorption and immune responses, leading to dysfunction of the first line of host defense.

The allergic child is frequently the first to manifest the effects of environmental changes. Therefore, research activities in host–microbe interaction aim at reversing the development of allergy and promoting tolerance. Nonetheless, current practices in the field of allergy are directed strongly towards treatment of established allergic disease. Prevention is better than

Preface

cure. Hence, the key to the control of allergic diseases may lie in exploiting endogenous immunological mechanisms. While acknowledging our imperfect understanding of how precisely these could be implemented to benefit the modern infant, there is one existing model. Breastfeeding, with an uninterrupted exchange of microbes between the mother and infant, joins several immunomodulatory components conferring passive protection but also actively stimulating the development of the infant's own immune system. Breast milk also provides a safe way to encounter several environmental antigens, such as potentially allergenic proteins in food, namely antigens processed by the mother's gut. Indeed, the direction of research should focus towards exploring such dietary compounds that have well-characterized properties beyond the traditional nutritional effects, i.e. health promotion and risk reduction of disease. With this aim, the workshop joins together outstanding scientists contributing to the research of different aspects of host-microbe interaction.

*Per Brandtzaeg
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Susan L. Prescott*

Foreword

The 64th Nestlé Nutrition Institute Workshop held in Sydney, Australia, was entitled ‘Microbial–Host Interaction: Tolerance vs. Allergy’. This workshop had the objective to follow-up on a series of four previous workshops focusing on allergy, tolerance and immunology. The first one took place in 1987 and was followed by three other workshops in 1993, 2003 and 2006. In the almost 20 years since the first workshop, research has evolved enormously on the topic and one specific focus that has currently moved to the center of allergy research is the role that microbes and their interaction with the host play in the process of immune programming.

Over the last decades nutritional therapies have been developed to prevent and treat allergic diseases. Nevertheless, the prevalence of allergic diseases as well as autoimmune diseases is continuously rising, and this is true for developing as well as developed countries. Changing environmental factors impacting on early microbe–host interaction and thus impacting on immune programming were clearly identified as key influence factors in this workshop. These changes also include nutritional changes. Thus, new approaches to allergy prevention and ways to favor oral tolerance development have been discussed. The role of dietary compounds, such as probiotics, prebiotics, modified proteins, long-chain polyunsaturated fatty acids, and antioxidants, and also the use of allergens to treat food allergies have been largely discussed.

The workshop brought together outstanding scientists with different backgrounds and invited pediatricians from 30 countries who contributed lively to the intense discussions.

Foreword

We want to thank the three chairpersons, Prof. *Per Brandtzaeg* from Oslo, Prof. *Erika Isolauri* from Turku and Prof. *Susan L. Prescott* from Perth for putting together this outstanding program and inviting speakers who are leading experts in their field. We also want to thank Dr. *Bianca-Maria Exl-Preysch*, Dr. *Peter Fryer* and their team for the excellent logistic support of the workshop and enabling the participants to get a memorable impression of ‘Down-Under’.

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