The Macro Influence of the Microbiome

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I am pleased to draw your attention to this, the first ever topical issue of Brief Reviews in The Journal of Immunology. Through seven Brief Reviews, this issue of The JI highlights the pervasive impact of the gut microbiome on immune functions, both in the gut and at distal sites, and features a cover chosen from a themed competition for this issue.

These compiled Brief Reviews underscore our recent appreciation that the far-reaching influence of commensal gut microbes on immune function reflects the coevolution of this symbiotic microbial ecosystem and its mammalian hosts. Authors Torow and Hornef emphasize that the nature of this microbial community in human and mouse early neonates impacts immune homeostasis throughout life (1). Grigg and Sonnenberg explore the reciprocal influence of the identity and localization of the microbiome components on the balance between inflammation and immune homeostasis both within and outside the gut, and point to the therapeutic potential for diseases of chronic inflammation provided by manipulation of the microbiota-host interactions (2). Elinav and coauthors describe the microbially derived and microbially modified small metabolites whose bioactivity mediates much of the influence on sterile host tissues described in the accompanying reviews, in part by modulating nutrient content, digestion, inflammation, and epigenetic control of transcription (3). Recognizing the sweeping impact of lifestyle changes in the Western world, Plunkett and Nagler highlight the influence of the microbiota and environmental exposure to microbial products on the acquisition of food allergies (4), whereas the focus of the Brief Review by Paun, Yau, and Danska is the effect of the resident gut microbiota on the rapid rise in the incidence of type 1 diabetes among genetically stable populations (5). Colpitts and Kasper document the influence of the gut microbiome on autoimmunity in the CNS mediated by alterations in the balance of effector and suppressor cells along the bidirectional gut–brain axis (6). Landay and coauthors highlight the clinical consequences of microbiome dysbiosis through the documented cross-talk between the gut microbiome and the immune system during HIV infection, with an eye to some of the recent technical advances that have illuminated this field (7). Taken together, these Brief Reviews provide an impressive illustration of the ongoing dialogue between the gut microbiota and the immune system which, when balanced at the ideal set point, maintains immune homeostasis, and when disrupted, drives far-ranging clinical consequences.

We are excited that this collection of topical Brief Reviews on “The Macro Influence of the Microbiome” inaugurates the 101st year of continuous publication of The Journal of Immunology, and underscores the breadth of the journal’s scope and the eclectic research interests of its readership. We hope to make this topical issue an annual event. Look for an announcement at the annual meeting of The American Association of Immunologists in Washington, DC, May 12–16, 2017, for the focus of next year’s topical issue of Brief Reviews.

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References