International Reviews of Immunology

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/iiri20

How metabolism and metabolites shape immunity during disease

Himanshu Kumar

To cite this article: Himanshu Kumar (2022) How metabolism and metabolites shape immunity during disease, International Reviews of Immunology, 41:3, 297-298, DOI: 10.1080/08830185.2022.2061764

To link to this article: https://doi.org/10.1080/08830185.2022.2061764

Published online: 26 May 2022.

INTERNATIONAL REVIEWS OF IMMUNOLOGY
2022, VOL. 41, NO. 3, 297–298
https://doi.org/10.1080/08830185.2022.2061764

Taylor & Francis
Taylor & Francis Group

EDITORIAL

How metabolism and metabolites shape immunity during disease

Himanshu Kumar, Ph.D.

Editor-in-Chief, International Reviews of Immunology & Principal Investigator, Laboratory of Immunology and Infectious Disease Biology, Indian Institute of Science Education and Research (IISER), Bhopal, MP, India

Cellular metabolism is a complex biological process governed by numerous biochemical reactions that maintain various cellular processes essential for cell survival and continuity of life. It is not only important for the maintenance of host physiology, but also plays a crucial role in shaping the host's defense system. The dynamicity of various immune components, immune responses and immune homeostasis during steady state or infection depends on the metabolic state of immune cells. Recently, it has been shown that various metabolite and metabolic enzymes play a pivotal role in the development of host immunity. This issue of *International Reviews of Immunology* focuses on the amino acid, sugar and lipid metabolisms and metabolic enzymes involved in host immunity during microbial infection and in different noninfectious defenses such as cancer, metabolic diseases and autoimmune diseases (Figure 1).

Cancer is caused by multiple factors both intrinsic and extrinsic. Intrinsic factors include irreparable DNA damage, loss of cell cycle regulation, dysregulation of immunity or metabolism etc. The extrinsic factors can be physical, chemical, biological or environmental. Additionally, some microbial infections by an oncogenic virus or bacterial infection can result in the development of cancer. In this issue, the article by Pirzadeh et al. discusses the role of *Helicobacter pylori* and a few amino acid metabolisms and metabolites in immune suppression, which subsequently results in gastric cancer. This article will be of interest to a broad readership in the fields of onco-immunology and infectious disease biology as well as researchers active at the junction between metabolism, immunology and cancer biology (Figure 1).

The innate and adaptive immune systems are strongly linked through dendritic cells (DCs) and the function of DCs can affect the disease outcome in infection as well as immune homeostasis in steady state. The article by Sun et al. describes how the alteration of available biomolecules in the DC microenvironment during metabolic diseases substantially affects the function of DCs. The altered microenvironment may cause immunopathogenesis of multiple diseases or enhancement of existing diseases. Also, the molecules which skew the metabolic condition can be a potential therapeutic agent. This article will be beneficial to readers working on the metabolic aspects of immunity and to clinical nutritionists working on disease control through the regulation of food intake (Figure 1).

Tryptophan metabolism and its metabolic product play a crucial role in various biological processes such as neurotransmission, stabilization of the circadian rhythm and synthesis of vitamin B3 which are essential for the normal physiology of the host. The article by Moein et al. elaborates the immunological role of tryptophan metabolite and its impact on inflammatory bowel disease and colorectal cancer. The article also discusses how the small molecule-based metabolic or enzyme inhibitor could manage these diseases. The article by Heidari et al. describes how a key enzyme, Indoleamine 2, 3-Dioxygenase (IDO), plays a pivotal role in the kynurenine pathway. The metabolic product produce by the action of this enzyme has immunomodulatory function and affect subsets of T cells and its balance ensures protection against cancer and autoimmune diseases. The small molecule-based manipulation of IDO could be a potential drug for IDO imbalance in the treatment of cancer and/or autoimmune diseases. These two articles will be useful to pharmacologists, chemists developing enzyme inhibitors, rheumatologists, cancer immunologists and

CONTACT Himanshu Kumar Himanshu.Kumar@taylorandfrancis.com Editor-in-Chief, *International Reviews of Immunology*, Laboratory of Immunology and Infectious Disease Biology, Indian Institute of Science Education and Research (IISER), Bhopal, Bhopal By-pass road, Bhauri, Bhopal 462066, Madhya Pradesh, India

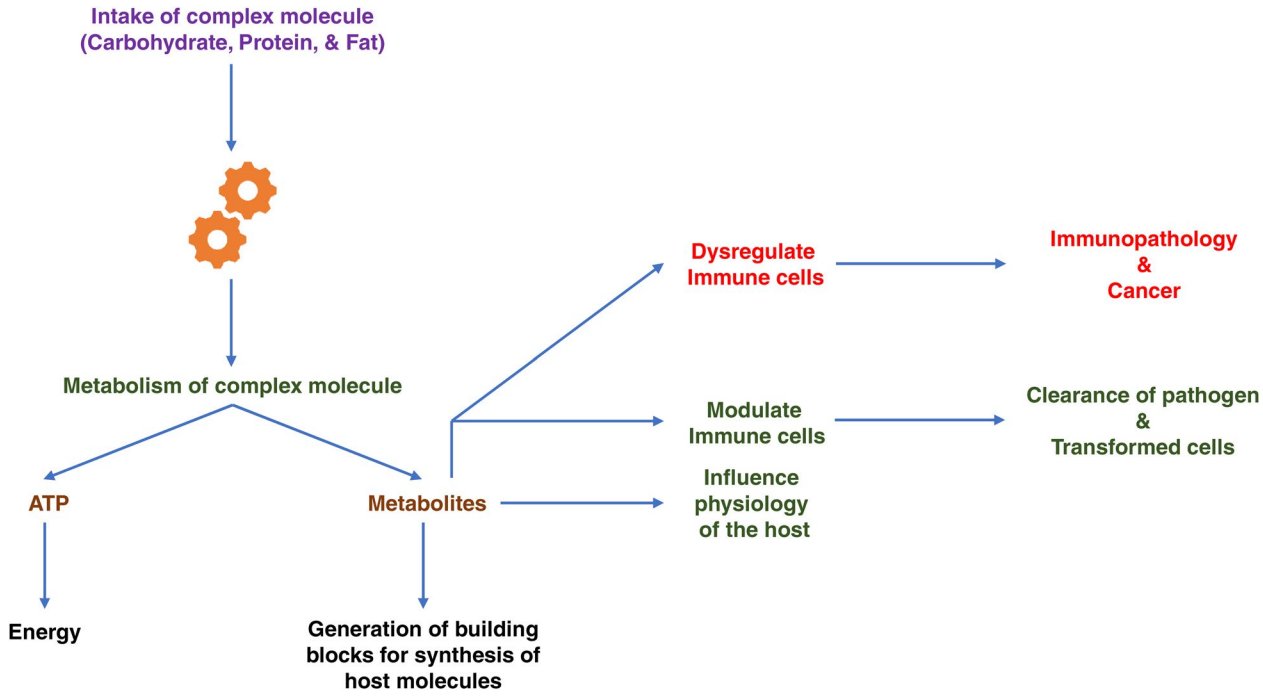

Figure 1. Metabolism and Immunity.

biochemists working on host defenses and various aspects of cancer (Figure 1).

Funding

The author(s) reported there is no funding associated with the work featured in this article.

References

1. The interplay between aryl hydrocarbon receptor, H. pylori, tryptophan, and arginine in the pathogenesis of gastric cancer. *Int Rev Immunol*. 2022;41(3):299–312. doi:10.1080/08830185.2021.1851371.
2. Immune metabolism: a bridge of dendritic cells function. *Int Rev Immunol*. 2022;41(3):313–325. doi:10.1080/08830185.2021.1897124.
3. Tryptophan metabolites modulate inflammatory bowel disease and colorectal cancer by affecting immune system. *Int Rev Immunol*. 2022;41(3):326–345. doi:10.1080/08830185.2021.1954638.
4. Indoleamine 2, 3-Dioxygenase: A Professional Immunomodulator and Its Potential Functions in Immune Related Diseases. *Int Rev Immunol*. 2022;41(3):346–363. doi:10.1080/08830185.2021.1836176.