

IMMUNOLOGY

Promoting immunology: The future is here

The field of immunology is in a period of unprecedented expansion and progress. Immunology is no longer just the specialized study of traditional immune cells and their roles in infection control, autoimmune disease, or transplant rejection. Rather, the influence of the immune system is vast, touching aspects of health and disease that are just beginning to be understood. For example, innate and adaptive immune cells contribute to diverse inflammatory disorders—fibrosis, cardiovascular and metabolic diseases, and even neurodegenerative diseases such as Alzheimer's and Parkinson's (1, 2). This influence arises, in part, from the unbounded nature of the immune system, which pervades all tissues and organs, with specialized functions elicited from environmental crosstalk in different systems. Yet, the corollary is also true—all cells may be immune cells with the right stimulus, including epithelial cells and cells that interact with the commensal organisms that make up the microbiome (3). *Science Immunology* will provide a broad platform for the most exciting findings in this growing field.

The immune system is mobile, and immune cells are found everywhere in the body. Both system-wide and local signals integrate immune cells throughout the organism and among organs, forming a network that may be tapped for therapeutic interventions (4). Yet, specialized collections of immune cells are now known to reside in different tissues, where they have tissue-specific functions and may become tissue-specific targets (5). In skin, resident dendritic and T cells contribute to the defense of the host against pathogens, whereas gut-resident immune cells can regulate the composition of the gut microbiome. Microglia in the brain comprise yet another tissue-resident immune cell type whose function is only now being elucidated. These tissue-specific local immune responses are just coming to light, and there are likely to be many more.

New tools at both systems and single-cell levels reveal the power of the immune system with exceptional precision and reach. Deep and single-cell sequencing can uncover the molecular features of the entire T and B cell immune repertoire and identify rare antibodies with exceptional potency and breadth, informing vaccine-developing efforts (6). Mass spectrometry and mass cytometry allow for the analysis of individual protein and metabolite abundances and of single cells with enough detail to enhance our understanding of how disease affects immune cell function and how immune cells direct disease (7). Breakthroughs in imaging and bioengineering can

boost targeted immune functions while minimizing unwanted effects (8).

Underlying these developments is the enormous potential of immunotherapy. Pioneering therapies that harness the immune system are changing the treatment landscape in cancer, allergy, transplantation, and autoimmunity, not to mention fibrosis, inflammation, and metabolic disease (9). Immunological advances are, in essence, clinical advances. As such, immunological insights from all model organisms are valuable, including studies using humans as a model organism. There is also an evolving collaboration between this journal and the Federation of Clinical Immunology Societies (FOCIS), which is dedicated to fostering knowledge sharing and advances in immunology with an emphasis on clinical aspects. Such a collaboration will help in promoting clinical immunology in the journal and within FOCIS and its constituent societies.

By showcasing studies that span disciplines and technologies, *Science Immunology* will encourage collaborative and innovative research. Advised by an international group of forward-thinking researchers in immunology and beyond, *Science's* newest journal will provide a broad platform for the most exciting findings in this growing field.

—Angela C. Colmone, Federica Sallusto,
Abul K. Abbas

1. M.-V. Guillot-Sestier, K. R. Doty, T. Town, Innate immunity fights Alzheimer's disease. *Trends Neurosci.* **38**, 674–681 (2015).
2. S. Epelman, P. P. Liu, D. L. Mann, Role of innate and adaptive immune mechanisms in cardiac injury and repair. *Nat. Rev. Immunol.* **15**, 117–129 (2015).
3. G. E. Kaiko, T. S. Stappenbeck, Host–microbe interactions shaping the gastrointestinal environment. *Trends Immunol.* **35**, 538–548 (2014).
4. E. V. Rothenberg, H. Y. Kueh, M. A. Yui, J. A. Zhang, Hematopoiesis and T-cell specification as a model developmental system. *Immunol. Rev.* **271**, 72–97 (2016).
5. M. Pasparakis, I. Haase, F. O. Nestle, Mechanisms regulating skin immunity and inflammation. *Nat. Rev. Immunol.* **14**, 289–301 (2014).
6. S. D. Boyd, J. E. Crowe Jr., Deep sequencing and human antibody repertoire analysis. *Curr. Opin. Immunol.* **40**, 103–109 (2016).
7. M. H. Spitzer, G. P. Nolan, Mass cytometry: Single cells, many features. *Cell* **165**, 780–791 (2016).
8. L. Jeanbart, M. A. Swartz, Engineering opportunities in cancer immunotherapy. *Proc. Natl. Acad. Sci. U.S.A.* **112**, 14467–14472 (2015).
9. W. Zou, J. D. Wolchok, L. Chen, PD-L1 (B7-H1) and PD-1 pathway blockade for cancer therapy: Mechanisms, response biomarkers, and combinations. *Sci. Transl. Med.* **8**, 328rv4 (2016).

Citation: A. C. Colmone, F. Sallusto, A. K. Abbas, Promoting immunology: The future is here. *Sci. Immunol.* **1**, aag2713 (2016).



Angela C. Colmone is the Editor of *Science Immunology*, American Association for the Advancement of Science, Washington, DC 20005, USA. Email: acolmone@aaas.org



Federica Sallusto is the Head of the Cellular Immunology Laboratory and Director of the Center of Medical Immunology, Institute for Research in Biomedicine, Università della Svizzera italiana, Bellinzona, Switzerland. Email: federica.sallusto@irb.usi.ch



Abul K. Abbas is the Distinguished Professor in Pathology and Chair of Pathology, University of California, San Francisco, San Francisco, CA 94143–0511, USA. Email: abul.abbas@ucsf.edu

2016 © The Authors, some rights reserved; exclusive licensee American Association for the Advancement of Science.

Promoting immunology: The future is here

Angela C. Colmone, Federica Sallusto and Abul K. Abbas

Sci. Immunol. 1, aag2713.
DOI: 10.1126/sciimmunol.aag2713

ARTICLE TOOLS

<http://immunology.sciencemag.org/content/1/1/aag2713>

REFERENCES

This article cites 9 articles, 2 of which you can access for free
<http://immunology.sciencemag.org/content/1/1/aag2713#BIBL>

Use of this article is subject to the [Terms of Service](#)

Science Immunology (ISSN 2470-9468) is published by the American Association for the Advancement of Science, 1200 New York Avenue NW, Washington, DC 20005. The title *Science Immunology* is a registered trademark of AAAS.

Copyright © 2016, American Association for the Advancement of Science