A new era of immunology

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Editorial
Immunology, a century-old branch of science, has enjoyed rapid development in recent years with the benefit of new, powerful approaches and technologies, such as systems biology and genome/proteome wide screening. This progress has yielded novel therapies (e.g. one of the leading medical discoveries of 2013 being tumour therapeutic antibodies against CTLA-4 and PD-1) as well as vital conceptual frameworks (e.g. innate immunity protein interaction networks). Immunology research will likely continue to progress at a rapid speed and help tackle pressing health issues, such as cancer, infection and diabetes.

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A classical immune response includes innate immunity and adaptive immunity. The former is a conserved mechanism using pattern recognition receptors that identify microbes with pathogen-associated molecular patterns to initiate an immune response, while the latter involves multiple processes (often later than innate immunity) that generate immune receptors to fight against pathogens. Pathogens can regulate their virulence factors or acquire antibiotic resistant genes to subvert or escape host immunity; on the other hand, the host also adapts to the pathogens they encounter through complex pathways.

Over the last decade, we have gained new concepts, including toll-like receptors, Th17 lymphocytes, autophagy and other homeostatic processes. Immunology has evolved from a lymphoid tissue-centric view to encompass the integration of tissue microenvironments, including epithelial cells as critical determinants of immune responses. Indeed, epithelial cells are increasingly indicated to play essential immune roles against pathogen invasion by forming barriers and secreting effectors, such as antimicrobial peptides, cytokines and chemokines.

A variety of new tools may be used to accelerate the development of both basic and clinical immunology. Immuno-informatics has also emerged as a critical field, not only directing the selection of key experiments but also accelerating the formulation of testable hypotheses by the analysis of complex immunologic data. Immunomics combines immunology with computer science, mathematics, chemistry, biochemistry, genomics and proteomics for a large-scale analysis of immune system function. New treatments may be introduced for every genetic and acquired immune disorder including differentiating induced pluripotent stem cells. Although translating these advances into improved diagnostics and therapies is not an easy task, immunology holds immense promise for the scientific community and general public in the coming years. Together, against this exciting backdrop, we will make OA Immunology a great journal.

References

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All authors abide by the Association for Medical Ethics (AME) ethical rules of disclosure.

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