Turning 10

Nature Reviews Immunology celebrates it 10th birthday this month, which provides an opportunity for us to take stock of the advances in the field of immunology over the past decade and to consider what the future might hold.

The aim of *Nature Reviews Immunology* since it first launched in 2001 has been to publish timely, authoritative and thought-provoking Review and Perspective articles covering all areas of immunology. The success of the journal largely reflects the quality of the authors and referees who have contributed to the journal over the years, whom we thank for their continued support.

When it came to assessing the key advances of the last decade, the obvious place to start was with the most highly cited articles from each year. So, to help us mark this anniversary, we asked the authors of these articles to reflect on the state of research at the time their Review was published and to discuss the future directions of their fields. Their insights are published in a freely available Viewpoint article (p693). In addition, we asked ~130 top researchers who have contributed to the journal to give us their thoughts on what the greatest achievements in immunology have been over the past 10 years. From the responses that we received, several themes have emerged.

One of the most significant advancements has been the linking of microbial recognition by innate immune cells with adaptive immune responses through the identification of what is an ever-growing list of 'sensor' molecules, including Toll-like receptors, other pattern- or damage-recognition receptors and inflammasomes. From these discoveries, a complex world of innate immune recognition, signal transduction, cross-regulation and inflammatory gene regulation has emerged that has broad therapeutic implications for diseases ranging from infection to autoinflammation to cancer.

The generation and function of regulatory T cells and the mechanisms of peripheral tolerance and immune suppression have been areas of active research and debate over the last 10 years. Great advances have been made, although more work is needed before we can effectively manipulate these processes in the clinic.

An emerging area of research is the impact of the microbiome (and virome) on the development and function of the immune system and its association with numerous diseases, including allergies, asthma, diabetes, obesity and cancer. Understanding the complexity of symbiotic microbial and viral communities and how they interact with and shape our immune system will be a prominent feature of immunology research in the coming years.

The past 10 years have also seen a greater appreciation of the plasticity of the immune system. It is now clear that an individual immune cell type (of either the innate or adaptive immune system) does not have only one function but exists as numerous subsets with distinct functional specializations. This is exemplified by the identification of multiple functionally distinct T helper cell, dendritic cell, monocyte and macrophage subsets. Furthermore, many immune cells can switch their functional activities in response to environmental cues, and there is great interest in unravelling this plasticity in an effort to understand the pathogenesis of chronic inflammatory diseases.

One final area that we wish to mention is the emerging realization that immune cells do not function in isolation, but that non-haematopoietic cells — including epithelial, endothelial and stromal cells — have a key role in determining immune homeostasis and activation.

But what does the future hold for immunology research? In addition to continued research in the areas mentioned above, for which many details have yet to be determined, we envisage a greater emphasis on human immunology research in the coming years. Further genetic studies in both healthy humans and humans with immune-mediated diseases, as well on cells from these individuals, should help to identify functional pathways that are disrupted in different disease states. These studies will aid the development of more targeted therapeutics. In addition, the identification of biomarkers that are predictive of successful therapy (rather than a reliance on clinical end points) should help to expedite immunotherapeutic trials. A continued effort to develop system-wide approaches for understanding the impact of genes and environment on disease pathogenesis should also be prominent. Perhaps we may even see an HIV vaccine?

Of course, these future areas are just a select view of all the potential discoveries that await us! So why don't you let us know what you think will be the key areas for research over the next 10 years? Send your thoughts via Twitter to @NatRevImmunol with the hashtag #futureimmunol.

As we enter our second decade, we look forward to further fruitful collaborations with leading researchers in immunology and to sparking the interest and imagination of those new to the field. We hope you enjoy the next 10 years of *Nature Reviews Immunology*!

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