



Special Issue Editorial

Special issue editorial: Recent progress of MicroRNA research in immunity



Over the past two decades, microRNA (miR) has been discovered and characterized in different types of cells including cancer cells and immune cells. MiRs play crucial roles in diverse biological processes including proliferation, activation, and differentiation in both innate and adaptive immune cells, and they are associated with pathology. MiRs generally act as an inhibitory molecule by post-transcriptional targeting downstream genes, leading to translational inhibition or mRNA decay. The miR-mRNA context is complex: one miR can target multiple mRNAs and one mRNA can be directly regulated by diverse miRs. Until now, miR research has attracted many scientists who have been working in cancer research and in immunology research fields over the past twenty years. The important immunology-related miRs and cancer-related miRs are so called immune-miRs and onco-miRs, which regulate immune cell responses and affect immune responses against cancer cells, respectively. MiRs indeed could connect immune cells with cancer cells in various microenvironment, which might be used as a diagnostic and prognostic biomarker and might potentiate the clinical cancer-immune therapy in future studies. This special issue “*MicroRNA Immunology*” in *Cancer Letters* highlights many key aspects of microRNA immunology and would provide a comprehensive understanding of microRNAs in immunology and cancer biology.

In the review “MiRNAs: dynamic regulators of immune cell functions in inflammation and Cancer”, Simon Hirschberger and colleagues summarize the immune-miRs and their roles in different immune cells. They discuss the implications of these miRs in tumor surveillance. In a related review article titled “Regulation of cancer immune escape: The roles of miRNAs in immune checkpoint proteins” Qin Yang and colleagues review the recent work on the relationship of miRs and immune check point proteins including PD-1 and CTLA-4 in the cancer cell-immune cell interactions. Their discussion would provide an insight into the various roles of miRs in cancer immune escape in detail. In a review “Emerging microRNAs in cancer diagnosis, progression, and immune surveillance”, Amani M. Harrandah and colleagues focus on two miRs—miR-21 and miR-375 in cancer progression and discuss their roles in RAS pathways in the context of cancer immune surveillance. “MicroRNAs as modulators of T cell functions in cancer” has been summarized by Stefan Emming and colleagues. In the review article, they provide the detailed information on three miRs: miR-155, miR-146a and miR-181a. They discuss the different aspects of these three miRs in T cell functions against cancer. In a review article titled with “The interplay between critical transcription factors and microRNAs in the control of normal and malignant myelopoiesis”, Christiaan J. Stavast and colleagues discuss recent findings on the interactions between miRs and transcriptional factors (TFs) in the myeloid-cell lineage differentiation. They summarize these interactions in acute myeloid leukemia (AML) and provide the information on how this miRs-TFs axis contributes to leukemogenesis.

Studies of miRs roles in autoimmune diseases also extend our knowledge of miRs in immunology. In the review “Dysregulation of microRNAs in autoimmune diseases: Pathogenesis, biomarkers and potential therapeutic targets”, Hai Long and colleagues discuss the recent findings on autoimmune diseases including lupus and arthritis. They provide the detailed information on dysregulation of autoimmune diseases which are mediated by miRs. They also discuss the novel miRs—exosomal miRs in autoimmunity. In a related review article titled with “MicroRNA-mediated immune regulation in rheumatic diseases”, Ian Kar Yin Lam and colleagues further highlight the crucial roles of miRs in autoimmune diseases including lupus and arthritis and discuss the potential of miRs as a biomarker or a therapeutic target in clinical trial in future. MiR-regulation has been discovered to be important for bacteria infections. In their review “miRNAs in immune responses to Mycobacterium tuberculosis infection”, Tianshu Yang and Baoxue Ge discuss that Mycobacterium tuberculosis (Mtb) infection is modulated by different miRs, and they provide the detailed information on miRs regulation of the host responses to the Mtb infection, further providing the potential of miRs in the diagnostic use in clinical. In “MicroRNAs in type 2 immunity”, Kristina Johansson and colleagues discuss about the type 2 immune responses as well as the related regulations by miRs, which would increase the depth of knowledge of almost the whole type 2 responses in immunology and cancer research.

Over the past ten years, the immune-metabolism has emerged as a hot research field which has attracted great attention of many scientists. In the review titled with “Emerging roles of microRNAs in the metabolic control of immune cells”, Qiuming Yao and colleagues review the recent findings on the metabolic regulation by miRs in different types of immune cells including macrophages, DCs, T cells and B cells. They discuss the great potential of cancer immune therapy based on targeting the immune-metabolism in future clinical studies.

Interestingly, immune responses in neonatal host are largely different from the responses in adult immune cells. In their review “Roles of microRNA in the immature immune system of neonates”, Hong-Ren Yu and colleagues review the different manifestations in both cellular and non-cellular parts.

They also discuss the recent findings of miRs regulation in neonatal immune cells, providing the potential of using anti-miRs for certain neonatal immune diseases in future studies.

In the review titled with “Diverse functions of miR-17-92 cluster microRNAs in T helper cells” Dirk Baumjohann focuses on summarizing the miR-17-92 cluster in T helper cells. He discusses the molecular interaction of miR-17-92 cluster in different types of T help cells, summarizing critical roles of this cluster in T helper cell differentiation, which might be used for designing the T-cell-based cancer immune therapy in future. In the review “miR-17–92 in lymphocyte development and lymphomagenesis”, Verena Labi and colleagues summarize

the detailed information of this cluster in lymphocytes development and pathology. In the review “The role of miR-183 cluster in immunity” Kenji Ichiyama and Chen Dong focus on another miR cluster—miR-183 cluster in the immune system. They discuss the detailed characteristics of this cluster in immune system, providing the great potential of targeting the whole this cluster or single member of this cluster in immune related diseases.

In summary, this special issue is a collection of mini-review articles covering the major immune topics related to both cancer and immune diseases. I trust the detailed information in this issue would provide sufficient evidence for the clinical potential of cancer-immune therapy. Additionally, I am grateful to all the authors in this special issue for

their contributions and I thank Prof. Manfred Schwab (Editor-in-Chief) and Josie Hutchins (Administrative Editor) for their great support and patience.

Conflicts of interest

The author has no conflicts of interest to disclose.

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